NO. 64 FALL 1989

$5 ($6 CANADIAN)

WHOLE EARTH REVIEW

ACCESS TO TOOLS AND IDEAS

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THE ALIEN INTELLIGENCE OF PLANTS

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Heliconia vaupésensis E.M.
Amazonas, Rio Vaupés

Margaret Mee

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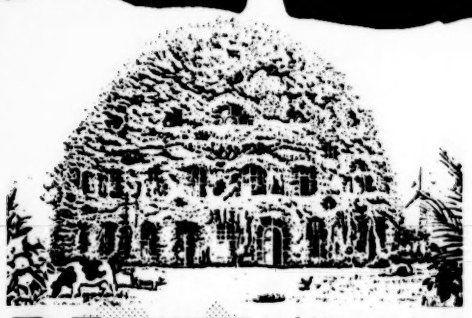

NON-LIVING architecture is an evolutionary mistake — parasitic, formalistic, non-productive, and anti-biotic. In evolution, all species who went in apartheid with plant life went extinct.

My research of the last twenty-five years shows that living, productive plant habitat is possible. Self-growing, energy-harvesting, air-delivered biotectonic plant shelter is possible if you want it. Do you really want to waste your life in some air-conditioned high-rise? Instead you can become a low-rise gardener-biotect (house farmer).

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I put on workshops that let the bioversity of Mother Nature teach you to grow biotecture with a good patch of forest on the seaside of Wales, Holland, Camargue . . . The starting capital will be your youth, your rebellious guts and the terrific smell of good soil in the forest (humus is related to the Latin for humor). Be sure to celebrate like devils when you move into your first leaky ivy house!

With grand Bio-gas salute from

Rudolf Doernach
Naturwerkstatt
Wildberg 4
D-7277 Gultlingen
West Germany ■

A poly-cultivar plant house with 20 different plants that makes a multi-purpose 12-meter space. Cost: approximately $1,200.

Understory of a biotectonic roof which will serve for water treatment, oxygen production, and will be combined with hi-tech solar collectors for complete autonomy.

Willow space frame planted to form a living bathroom/digestor unit for biovillage.

BIOTECTURE

Beech house over fountain. Requires two trimming cuts per year. Cost: approximately $300.

"La verdad es verde," a two-story plant house prototype developed at a Biolivia workshop in South America.

Biotectonic plant curtain on this building produces 25 essential bio-values like oxygen production.

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Plants of the Gods

A SPECIAL SECTION: PLANTS AS TEACHERS

Mandragora femina

FRONT COVER: An otherworldly Amazonian plant, a relative of the banana. Its botanical classification has not been fully determined yet. Margaret Mee, scientific illustrator and artist, tentatively labeled it *Heliconia uauapensis*, after the village (Uauapes) in the Rio Negro river basin of the Amazon, where she found and painted it (see review, p. 15).
© From *Flowers of the Amazon Forests*, Margaret Mee, Nonesuch Expeditions.

• *The Margaret Mee Amazon Trust Fund preserves a collection of 60 of her paintings and also seeks to create a scholarship for Brazilian botanical students to carry out field research in Amazonia. Donations can be made to Margaret Mee Amazon Trust, c/o Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, UK.*

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Whole Earth Review □ *Issue No. 64 □ September 12, 1989 (ISSN 0749-5056) (USPS 077-150). Published quarterly by POINT, a California nonprofit corporation. Editorial office: 27 Gate Five Road, Sausalito, CA 94965; 415/332-1716. Subscriptions $20 per year; single copies $5. Inquire for first class and international air rates. Second-class postage paid at Sausalito, California, and at additional mailing offices. Claims for missing issues will not be honored later than six months after publication. Back issues are available on microfilm and as xerographic reprints from University Microfilms International, Serials Bid Coordinator, 300 Zeeb Road, Ann Arbor, MI 48106. Whole Earth Review is indexed by Access: The Supplementary Index to Periodicals, Alternative Press Index, Magazine Index, Consumers Index, and Humanities Index.*

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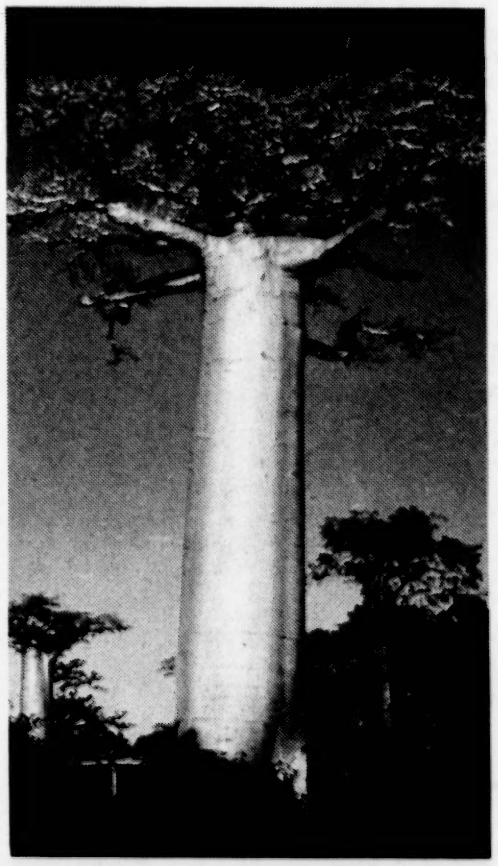
POSTMASTER: Send address changes to Whole Earth Review, *P. O. Box 38, Sausalito, CA 94966.*

The Self-Organizing Mind Of Plants



Baobab, *Adansonia sp.*, from Madagascar.

ACCORDING to Greg Williams, who collects and publishes HortIdeas, *the mind of plants might best be introduced to* WER *readers with this:*

"Plants are about as different from humans as living beings anywhere in the Universe could get, even more different from us than some inanimate things: poets anthropomorphize the sea and mountains, and we all anthropomorphize certain artifacts (automobiles and computers come to mind), but we anthropomorphize plants only with great difficulty. Our needs and wants are obviously not theirs. By and large, this was understood by the ancients (and is understood by contemporary 'primitive' peoples): human-like spirits dwell(ed) in or around plants, but the plants are (were) not human-like. Few children's stories are populated with plant characters. . . . The history of our interactions with plants could be seen as the history of an encounter between people and an alien form of life."

I would go on to suggest that the alien intelligence resident in plants is perfectly suited for the non-animal world we human animals have built around us. Gradually we have erected a mechanical ecology of houses, plumbing, wires, factories. This manufactured world is so destructive of plant life precisely because it is a competitor, working in the same mode as plants — solid-state, stationary, and perennial. The dim self-consciousness that we might concede to our networks of telephones, computers, and traded goods, is distinctly non-human, but rather similar to the whole-system smartness in plants. As we grope for ways to make this fecund artificial environment more self-sustaining and manageable, plants are the ideal teachers.

In a world of complexity, plants are a metaphor that makes sense. Computer scientists consider plants as a way of thinking. Here's mathematics hacker Rudy Rucker on trying to optimize software: "Take an oaktree: it grows from an acorn, right? The acorn is the program and the oaktree is the output. The runtime is like 80 years. That's the best kind of computation . . . where a short program runs for a long time and makes an interesting image." An acorn is more than shareware; it's a superior way to run a self-sustaining system.

Plants have much to teach about themselves, too. It is perhaps divine justice that the radical ideas of plants are dispersed without favor throughout the world — in lowly weeds and rare exotics, in desert herbs and jungle vines, in "poor" countries and rich. Indeed it is some of the "poor" countries that are richest in this new "commodity": untapped stores of plant ideas. Their plant wealth is partially in the diversity of genes in their native botany — and they are beginning to view the steady stream of gene hunters from developed countries as stealing valuable heirlooms without compensation. This year diversity-rich/research-poor countries have organized a United Nations commission to implement a fairer exchange of plant genetic matter.

The unparalleled richness of knowledge about plants kept by aboriginal peoples is the most valuable green wealth of undeveloped countries. Destroying a rainforest not only destroys a gene bank, it also destroys a meme bank — all the future solutions, models, discoveries, and deep, replicating ideas that were held in the genes and partially extracted over centuries by careful shamans. That native scholarship with plants is a vanishing resource.

Tending the modern-day plant-meme bank is a network of information shamans, a few of whom are responsible for this issue. Principal among these are Terence McKenna and Howard Rheingold, who fashioned the editorial direction of the next 75 pages. Terence, his wife Kat, and his brother Dennis have been investigating and promoting the self-organizing mind of plants for nearly two decades. Howard, although newly converted to Plant Religion, is a veteran explorer of other ways of thinking (one of his many books is Excursions to the Far Side of the Mind*). One of our conversations together reminded me of a prediction by Peter Drucker, the world-renowned business philosopher who in the 1950s correctly forecast the coming of Knowledge Workers. He wagered that the 1990s would be a decade not of electronics, but of biology. This issue seconds the notion.*

Biology, particularly botany, has always flourished with the amateur scientist's admirable skills — a reliance on empirical knowledge, and a capacity to engulf the subject in its entirety by means of unbridled passion. The whole-systems approach of an amateur is so suited for the green cybernetics of plant life, and the plant cortex is so uncharted, that an amateur could pick a green spot on the world map by throwing a dart, and quickly become the world's expert on what those plants know. In the following special section are reports by those who have allowed themselves to be tutored by the alien mind of plants. —*Kevin Kelly*

Caudiciform & Pachycaul Succulents

Nick McBreen/The Ecologist

PLAN PLANT PLANET

BY TERENCE McKENNA

OUR PRESENT GLOBAL CRISIS is more profound than any previous historical crises, hence our solutions must be equally drastic. I propose that we should adopt the plant as the organizational model for life in the 21st century, just as the computer seems to be the dominant mental/social model of the late 20th Century, and the steam engine was the guiding image of the 19th Century.

This means reaching back in time to models that were successful 15,000 to 20,000 years ago. When this is done it becomes possible to see plants as food, shelter, clothing, and sources of education and religion.

The process begins by declaring legitimate what we have denied for so long. Let us declare Nature to be Legitimate. All plants should be declared legal, and all animals for that matter. The notion of illegal plants and animals is obnoxious and ridiculous.

Re-establishing channels of direct communication with the planetary Other, the mind behind nature, through the use of hallucinogenic plants is the last best hope for dissolving the steep walls of cultural inflexibility that appear to be channeling us toward true ruin. We need a new set of lenses to see our way in the world. When the medieval world shifted its world view, secularized European society sought salvation in the revivifying of Classic Greek and Roman approaches to law, philosophy, esthetics, city planning and agriculture. Our dilemma will cast us further back into time in a search for models and answers.

The impact of hallucinogenic plants on the evolution and emergence of human beings has not been widely examined, yet it promises to provide

an understanding not only of primate evolution but also of the emergence of the cultural forms unique to *Homo sapiens*.

The adaptive advantage conferred by using immune-stimulating or appetite-suppressing plants is not difficult to understand. Less easy to understand is the way in which plant hallucinogens might have provided similar yet different adaptive advantages to our remote ancestors. These compounds do not catalyze the immune system into higher states of activity, although this may be a secondary effect. Rather, they catalyze consciousness, that peculiar, self-reflecting ability that has reached its greatest apparent expression in human beings. One can hardly doubt that consciousness, like the ability to resist disease, confers an immense adaptive advantage on any individual who possesses it.

There is a hidden factor in the evolution of human beings which is neither a "missing link" nor a *telos* imparted from on high. I suggest that this hidden factor in the evolution of human beings, the factor which called human consciousness forth from a bipedal ape with binocular vision, involved a feedback loop with plant hallucinogens. This is not an idea that has been widely explored, though a very conservative form of this notion appears in R. Gordon Wasson's *Soma: Divine Mushroom of Immortality* (Wasson, 1971). Wasson does not comment on the emergence of humanness out of the primates, but does suggest hallucinogenic mushrooms as the causal agent in the appearance of spiritually aware human beings and the genesis of religion. Wasson feels that omnivorous foraging humans would sooner or later have encountered hallucinogenic mushrooms or other psychoactive plants in their environment.

The strategy of these early human omnivores

was to eat everything and to vomit whatever was unpalatable. Plants found to be edible by this method were then inculcated into the diet. The mushrooms would be especially noticeable because of their unusual form and color. The state of consciousness induced by mushrooms or other hallucinogens would provide a reason for foraging humans to return repeatedly to those plants, in order to re-experience their bewitching novelty. This process would create what C.H. Waddington (1961) called a "creode," a pathway of developmental activity (in other words, a habit).

Habituation to the experience was insured simply because it was ecstatic. "Ecstatic" is a word unnecessary to define except operationally: An ecstatic experience is one that one wishes to have over and over again.

If hallucinogens are operating as exo-pheromones, that is inter-species chemical messengers, then the dynamic symbiotic relationship between primate and hallucinogenic plant is actually a transfer of information from one species to another.

The primate gains increased visual acuity and access to the transcendent Other. The benefits to the mushroom arose out of the primate domestication of previously wild cattle, hence the expansion of the niche occupied by the mushroom. Where plant hallucinogens do not occur, such processes take place with great slowness, but in the presence of hallucinogens a culture is introduced to ever more novel information, sensory input and behavior, and thus is bootstrapped to higher and higher states of self-reflection.

Hallucinogenic plants may have been the catalysts for everything about us that distinguishes us from other primates except perhaps the loss of body hair. All of the mental functions which we associate with humanness, including recall, projective imagination, language, naming, magical speech, dance, and a sense of *religio* may have emerged out of interaction with hallucinogenic plants. Our society more than others will find this theory difficult to accept because we have made pharmacologically obtained ecstasy a taboo. Sexuality is a taboo for the same reason: such things are consciously or unconsciously sensed to be entwined with the mysteries of where we came from and how we got to be the way we are.

THE SOLUTION to much of modern malaise, including chemical dependencies and repressed psychoses and neurosis, is direct exposure to the authentic dimensions of risk represented by the experience of psychedelic plants. *The pro-psychedelic plant position is clearly an anti-drug position. Drug dependencies are the result of habitual, unexamined and obsessive behavior; these*

Why People Take Drugs

Use of drugs by human societies is as old as humanity itself. What is it in the nature of human beings that allows them to form nearly symbiotic relationships with plants and chemicals in the natural, and now technological, world around them? Our omnivorous dietary habits have made us the vector of myriad mutagenic influences that together have shaped human evolution in strange and unique ways. The emergence of self-awareness and of cultural forms is a reflection of internal states of awareness that are profoundly mediated by our relationships to psychoactive and physiologically active plants, foods, drugs, and spices. Detailed discussion of the previously unexamined relationships of drugs to cultural self-expression provides a new way of thinking about human history; as a series of arrangements, made and broken, between human beings and plants. Paleolithic shamanism provides the archaic paradigm. The Eleusinian mysteries provide the Classical example, and modern use of coffee, alcohol, sugar and tobacco illustrate the way in which exploration and new technologies seem to mean new drugs and new habits. The Age of Exploration introduced more than spices into Europe; so great was the European obsession with addiction to white sugar that slavery, no more than a curiosity in the West since the fall of Rome, was brought back with a vengeance in the 15th century in order to provide labor for the killing work of sugar production. When the English overseas tea trade collapsed, the British use of military force secured the right to sell opium in China. This policy provides the bridge to modern developments: the scourge of refined narcotics, heroin, cocaine and crack. The modern synthetic drugs have created financial rogue empires in many cases more powerful than the nations that sanctioned their creation. The message is that history is to be seen as a series of evolving and transforming relationships to plants, from corn to *Cannabis*, a process that we need now to understand as modern pharmacology and lifestyles put into our hands ever more powerful ways to satisfy and explore the habit habit.

The Greek herbalist Dioscorides receives a mandrake plant from Heuresis, the goddess of discovery. Since ancient time, mandrake has been credited with numerous magical and healing powers, in part because of the root's resemblance to a human figure. It is still used in the treatment of asthma, coughs, and hay fever.

The Plant That Speaks

Psilocybe mexicana.

The Mazatecs say that the mushrooms speak. If you ask a shaman where his imagery comes from, he is likely to reply: "I didn't say it, the mushrooms did." No mushroom speaks, that is a primitive anthropomorphization of the natural, only man speaks, but he who eats these mushrooms, if he is a man of language, becomes endowed with an inspired capacity to speak. The shamans who eat them, their function is to speak, they are the speakers who chant and sing the truth, they are the oral poets of their people, the doctors of the word, they who tell what is wrong and how to remedy it, the seers and oracles, the ones possessed by the voice. "It is not I who speak," said Heraclitus, "it is the Logos." Language is an ecstatic activity of signification. Intoxicated by the mushrooms, the fluency, the ease, the aptness of expression one becomes capable of are such that one is astounded by the words that issue forth from the contact of the intention of articulation with the matter of experience. At times it is as if one were being told what to say, for the words leap to mind, one after another, of themselves without having to be searched for; a phenomenon similar to the automatic dictation of the surrealists except that here the flow of consciousness, rather than being disconnected, tends to be coherent; a rational enunciation of meaning. Message fields of communication with the world, others and one's self are disclosed by the mushroom. The spontaneity they liberate is not only perceptual but linguistic, the spontaneity of speech, of fervent, lucid discourse, of the logos in activity; for the shaman, it is as if Existence were uttering itself through him . . . words are materializations of consciousness; language is a privileged vehicle of our relation to reality.
— Henry Munn, "The Mushroom of Language," in *Hallucinogens and Shamanism*, Michael Harner, ed., Oxford Press, 1973, pp. 88-89.

are precisely the tendencies in our psychological make-up that the psychedelics mitigate. The plant hallucinogens dissolve habits and hold motivations up to inspection by a wider, less egocentric and more grounded point of view within the individual. It is foolish to suggest that there is no risk, but it is equally uninformed to suggest that the risk is not worth taking. What is needed is experiential validation of a new guiding image, an overarching metaphor able to serve as the basis for a new model of society and the individual.

The plant/human relationship has always been the foundation of our individual and group existence in the world. What I call the Archaic Revival is the process of reawakening awareness of traditional attitudes toward nature, including plants and our relationship to them. The Archaic Revival spells the eventual breakup of the pattern of male dominance and hierarchy based on animal organization, something that cannot be changed overnight by a sudden shift in collective awareness. Rather it will follow naturally upon the gradual recognition that the overarching theme that directs the Archaic Revival is the idea/ideal of a vegetation Goddess, the Earth herself as the much ballyhooed Gaia — a concept well documented by 19th-century anthropologists, most notably Fraser, but recently given a new respectability by Riane Eisler, Marija Gimbutas and others.

The closer a human group is to the gnosis of the vegetable mind — the Gaian collectivity of organic life — the closer their connection to the archetype of the Goddess, hence to the partnership style of social organization. The last time that the mainstream of Western thought was refreshed by the gnosis of the vegetable mind was at the close of the Hellenistic era, before the Mystery religions were finally suppressed by enthusiastic Christian barbarians.

My conclusion is that taking the next evolutionary step, the Archaic Revival, the rebirth of the Goddess and the ending of profane history, are agendas that implicitly contain within themselves the notion of our re-involvement with and the emergence of the vegetable mind. That same mind that coaxed us into self-reflecting language now offers us the boundless landscapes of the imagination. Without such a relationship to psychedelic exo-pheromones regulating our symbiotic relationship with the plant kingdom we stand outside of an understanding of planetary purpose. And understanding of planetary purpose may be the major contribution that we can make to the evolutionary process. Returning to the bosom of the planetary partnership means trading the point of view of the history-created ego for a more maternal and intuitional style.

The widely felt intuition of the presence of the Other as a female companion to the human navigation of history can, I believe, be traced back to the immersion in the vegetable mind which provided the ritual context in which human consciousness emerged into the light of self-awareness, self-reflection, and self-articulation; the light of the Great Goddess.

What does it mean to accept the solutions of

vegetable forms of life as metaphors for the conduct of the affairs of the human world? Two important changes would follow from adopting this assumption:

The feminizing of culture on a level that has yet to be fully explored; Green Consciousness means recognizing that the real division between the masculine and the feminine is not a division between men and women, but rather is a division between ourselves as conscious animals — omnivorous, land-clearing war-makers, supreme expression of the yang — and the circum-global mantle of vegetation — the ancient meta-stable yin element that constitutes by far the major portion of the biomass of the living earth.

An inward search for values. Inwardness is the characteristic feature of the vegetable, rather than the animal, approach to existence. The animals move, migrate and swarm while plants hold fast. Plants live in a dimension characterized by the solid state, the fixed and the enduring. If there is movement in the consciousness of plants then it must be the movement of spirit and attention in the domain of the vegetal imagination. Perhaps this is what the reconnection to the vegetal Goddess through psychedelic plants, what the Archaic Revival actually points toward, that the life of the spirit is the life that gains access to the visionary realms resident in magical plant teachers. This is the truth that shamans have always known and practiced. Awareness of the green side of mind was called *Veriditas* by the 12th-century visionary Hildegard von Bingen.

A NEW PARADIGM capable of offering hope of a path out of the cultural quicksand has to provide a real-world agenda addressed to the escalating problems that the planet faces. There are several domains in which the rise of awareness of *Veriditas* might help stave off Armageddon:

Detoxification of the natural environment. This is a process that is naturally carried out by the combined action of the atmosphere, the biological matrix and the oceans. This planet-wide process was able to take care of even urban industrial waste, until modern industrial technology became a truly global phenomenon. Planting species of Datura, the plants once a part of the religious rites of the Indians of Southern California, and other plants that leach heavy metals from the earth and sequester them in their cellular tissue, is an example of a natural process that could help clean up our environment. Recognizing the many ways in which the biological matrix of the earth functions to avert toxification, recognizing that nature is working to sustain life, might go a long way toward building a political consensus to actively participate in saving that same life.

Green Inheritance

The shrub* Datura stramonium *can act like a toxin sponge, leaching heavy-metal elements from polluted soils. The toxins are concentrated in its tissue, which can then be removed.

Connectedness and symbiosis. Like plants, we need to maximize these qualities. Plant-based approaches to modeling the world include awareness of the fractal and branching nature of community action. A tree-like network of symbiotic relationships can now replace the model of evolution that we inherited from the 19th Century. The earlier model, that of the tooth-and-claw struggle for existence, with the survivor taking all, is a model based on naive observation of animal behavior. Yet it was cheerfully extended into the realm of plants to explain the evolutionary interactions thought to cause speciation in the botanical world. Later, more sophisticated observers (C. H. Waddington and Erich Jantsch) found not the War in Nature that Darwinists reported but rather a situation in which it was not competitive ability but *ability to maximize cooperation with other species* that most directly contributed to an organism's being able to function and endure as a member of a biome. Plants interact with each other through the tangled mat of roots that connects them all to the source of their nutrition and to each other.

The matted floor of a tropical rain forest is an environment of great chemical diversity; the topology approaches that of brain tissue in its complexity. Within the network of interconnected roots complex chemical signals are constantly being transmitted and received. Co-adaptive evo-

lution and symbiotic relationships regulate this entire system with a ubiquitousness that argues for the evolutionary primacy of these cooperative strategies. For example, *mycorrhizal* fungi live in symbiosis on the outside of plant roots and gently balance and buffer the mineral-laden water that is moving through them to the roots of their host.

Whole system fine-tuning is needed. If the phenomena associated with biological harmony and resonance could be understood, then such large-scale systems as global banking or global food production and distribution could be more properly managed. The Gaian biologists, Lovelock, Margulis and others have argued persuasively that the entire planet has been self-organized by microbial and planktonic life into a meta-stable regime favorable to biology and maintained there for in excess of two billion years. Plant-based Gaia has kept a balance throughout time and space. And this in spite of the repeated bombardment of the earth by asteroidal material sufficient to severely disrupt the planetary equilibrium. We can only admire — and we should seek to imitate — such a Tao-like sense of the planet's multi-dimensional homeostatic balance. But how? I suggest we look at plants — look more deeply, more closely, and with a more open mind than we have done before.

Recycling. Like plants we need to recycle. On a cosmic scale we are no more mobile than plants. Until this point in history we have modeled our more successful economic systems on animal predation. Animals can potentially move on to another resource when they exhaust the one at hand. Since they can move to new food sources, they potentially have unlimited resources. Plants are fixed. They cannot easily move to richer nutrients, or leave an area if they foul or deplete it. They must recycle well. The fostering of a plant-based ethic that emulates the way in which the botanical world uses and replaces resources is a

sine qua non for planetary survival. All capitalistic models presuppose unlimited exploitable resources and labor pools, yet neither should now be assumed. I do not know the methods but I suggest that we start turning to the plant world to discover the right questions to ask.

Photovoltaic power is part of the shift toward an appreciation of the elegance of the solid state that plants possess. Plants practice photosynthetic solutions to the problems of power acquisition. Compared to the water- or animal-turned wheel, which are the Ur-metaphors for power production in the human world, the solid-state quantum-molecular miracle which involves dropping a photon of sunlight into a molecular device that will kick out an electron capable of energetically participating in the life of a cell seems like extravagant science fiction. Yet this is, in fact, the principle upon which photosynthesis operates. While the first solid-state devices arrived on the human cultural frontier in the late 1940s, solid-state engineering had been the preferred design approach of plants for some two thousand million years. High-efficiency photovoltaics could today meet the daily needs of most people for electricity. It is the running of basic industries on solar energy that has proved difficult. Perhaps this is nature's way of telling us that we aspire to too much manufacturing.

A global atmosphere-based energy economy. The approach of vegetational life to energy production is called photosynthesis. This process could be modeled by the creation of a global economy based on using solar energy to obtain hydrogen from seawater. Solar electricity could supply most electricity needs, but the smelting of aluminum and steel and other energy-intensive industrial processes make demands that photovoltaic electricity is unlikely to be able to meet. However there is a solution: plants split atmospheric carbon dioxide to release energy and oxygen as by-

Matter and Energy in the Rainforest

Green Inheritance

The factors that ordinarily limit growth in the temperate region — low temperatures, lack of water and a short growing season — are of little importance in the humid tropics. Except on alluvial land and in areas where the soil is frequently enriched by volcanic dust, however, the stock of available mineral nutrients is quite small. The rain forest is able to flourish under these conditions because a large fraction of the available nitrogen, calcium, phosphorus, potassium and other minerals is held in the vegetation itself. The nutrients contained in dead wood and leaves and in the excretions and dead bodies of animals are quickly released by the activities of the decomposer organisms. Once the dead material has been broken down the minerals do not remain in the soil but are almost immediately taken up by the roots of the trees and other plants. Thus, although the total stock of nutrients is not large, recycling is rapid. It is also efficient; very little is lost from the system.

—*Scientific American*, Dec. 1973, p. 63.

products. A similar but different process could use solar electricity to split water, to obtain hydrogen. This hydrogen could be collected and concentrated for later distribution. Plants have been very successful at finding elegant solutions based on material present at hand; a hydrogen economy would emulate this same reliance on inexhaustible and recyclable materials.

The notion is a simple one really; it has long been realized by planners that hydrogen is the ideal resource to fuel a global economy. Hydrogen is clean; when burned it recombines with the water it was chemically derived from. Hydrogen is plentiful; one third of all water is hydrogen. And all existing technologies — internal-combustion engines, coal-, oil- and nuclear-fired generators could be retro-fitted to run on hydrogen. Thus we are not talking about having to scrap the current standing crop of existing power production and distribution systems. Hydrogen could be "cracked" from seawater at a remote island location and then moved by the already existing technology that is used for the ocean transport of liquid natural gas from its production points to market. The objection that hydrogen is highly explosive and that proven technologies for handling it do not exist has largely been met by the liquid-natural-gas industry and its excellent safety record. Hydrogen accidents could be extremely destructive, but they would be ordinary explosions; local, non-toxic and without release of radioactivity. Like plant life itself, the hydrogen economy would be non-polluting and self-sustaining; burned hydrogen recombines with oxygen to again become water.

An international effort of extraordinary scope would be necessary to begin to move toward a proof-of-concept demonstration of the feasibility of a hydrogen economy. Granted that there are many possible problems with such a scheme. But no plan for the production of energy sufficient to meet the needs of the 21st Century is going to be without difficulties.

Nanotechnology. The era of Molecular Mechanism (*WER* #54, p. 9) promises the most radical of the green visions since it proposes that human-engineered quasi-biological cells and organelles take over the manufacturing of products and culture. Nanotechnology takes seriously the notion that manufacturing techniques and methods of manipulating matter on the micro-physical scale can affect the design process of the human-scale world. In the nanotech world, dwellings and machines can be "grown" and everything that is manufactured is closer to flesh than to stone. The distinction between living and non-living, and organic and artificial, is blurred in the electronic coral reef of human/machine symbiosis contemplated by the savants of nanotechnology.

From *Vegetalismo*

(To be accompanied by the musical notation for* icaro to increase the effects of ayahuasca *from Luna 1984a)

These plants [tobacco and ayahuasca] belong to a series of species called "doctores" by local practitioners, because if ingested under certain conditions, they are believed to be able to "teach" the shamans. During the initiation period, which may last from some months up to several years, these plants are ingested periodically and successively, while a very strict diet and sexual continence are observed. The informants I worked with affirm that the spirits or mothers of the plants present themselves to the initiated, either during the visions they elicit, or during the dreams, and teach them how to diagnose and cure certain illnesses, how to dominate evil spirits who live in the earth, in the water or in the air, how to travel through time and space, and how to perform a series of shamanic tasks.

These powers are acquired mainly through the memorization of magic melodies or songs, called icaros. The number and quality of their icaros is the best gauge of the knowledge and power of a shaman. All my informants claim to know dozens of them. . . .

Each plant has its icaros, so that the repertoire of the shaman apprentice expands as he keeps adding other plants to the basic ayahuasca preparation (*Banisteriopsis caapi* + *Psychotria viridis*), or when he ingests other plant-teachers that are taken by themselves. The acquisition of magic chants or melodies and the memorization of myths during shamanic initiation seem to be a widely reported phenomenon. I have not yet made a systematic bibliographic survey, but it is possible that the association of the learning of magic chants or melodies with the absorption of the psychotropic plants is quite common. It is found among the Huichol, who ingest peyote (*Lophophora williamsii*) and other psychotropic plants, among the Mazatec,

Where the Gods Reign

This young man is holding the most potent of the South American hallucinogens, known among the Kamsá Indians as culebra borrachera (Methysticodendron). *He will drink a tea of this plant, material rich in scopolamine and other intoxicating alkaloids, to induce visions and to establish "learning spirit" with his teacher.*

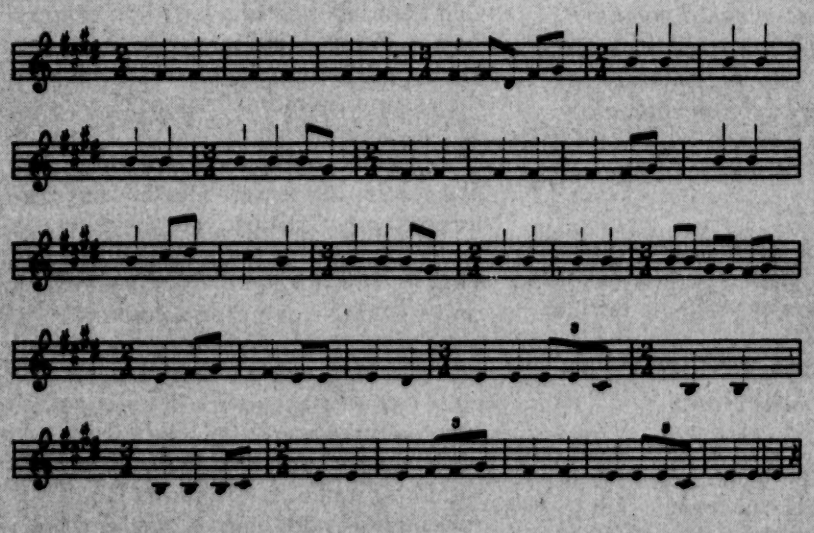
Preservation of biological diversity. The life on this planet and the chemical diversity that it represents are likely to be the only sources of biologically evolved compounds until the day that we discover another planet as teeming with life as our own. Yet we are destroying the living diversity of our world at an appalling rate. This must be stopped, not only through the preservation of ecosystems but also through the preservation of information about those ecosystems that has been accumulated over thousands of years by the people who live adjacent to them. It is impossible to underestimate the importance for human health of preservation of folk knowledge concerning healing plants. All the major healing drugs that have changed history have come from living plants and fungi. Quinine made conquest of the tropics possible, penicillin and birth control pills remade the social fabric of the twentieth century. All three of these are plant-derived pharmaceuticals. My partner Kat and I work in this area by managing a botanical garden in Hawaii (see p. 54) that seeks to preserve the plants utilized in Amazonian shamanism, one of many such systems of knowledge that are fast disappearing.

The measures outlined above would tend to promote what might be called a sense of Gaian Holism, that is a sense of the unity and balance of nature and of our own human position within

that dynamic and evolving balance. It is a plant-based view. This return to a perspective on self and ego that places them within the larger context of planetary life and evolution is the essence of the Archaic Revival. McLuhan was correct to see that planetary human culture, the global village, would be tribal in character. The next great step toward a planetary holism is the partial merging of the technologically transformed human world with the archaic matrix of vegetable intelligence that is the Overmind of the planet.

I hesitate to call this dawning awareness religious, yet that is what it surely is. And it will involve a full exploration of the dimensions revealed by plant hallucinogens, especially those structurally related to neurotransmitters already present and functioning in the human brain. Careful exploration of the plant hallucinogens will probe the most archaic and sensitive level of the drama of the emergence of consciousness; it was in the plant/human symbiotic relationships which characterized archaic society and religion that the numinous mystery was originally experienced. And this experience is no less mysterious for us today, in spite of the general assumption that we have replaced the simple awe of our ancestors with philosophical and epistemic tools of the utmost sophistication and analytical power. Our choice as a planetary culture is a simple one: go Green or die. ■

Icaro to increase the ayahuasca visions



who take mushrooms of the genus *Psilocybe,* among mestizo practitioners using San Pedro (*Trichocerus pachanoi*), among the Yanomamo of southern Venezuela and northern Brazil, who use epena (*Virola theidora*).
I have found the idea that certain plants teach magic melodies intimately linked with the use of ayahuasca among Indian and mestizo populations of Caqueta, in Colombia, and in the provinces of Loreto, Ucayali and Madre de Dios in Peru. In the state of Acre, in Brazil, there are communities who ingest the preparation of *Banisteriopsis caapi* + *Psychotria viridis* under the name Santo Daime. All these communities possess *himnarios,* collections of songs inspired by Santo Daime to certain privileged members. Some of these communities have memorized up to 3,000 *himnos.*

[Both healing shamans and those who practice sorcery] affirm that their powers are embodied in their icaros. Don Alejandro, another of my informants, put it in these words: "A man is like a tree. Under the appropriate conditions he grows branches. These branches are the icaros."

. . . The shaman is often at the same time a scientist, an artist, a hunter and a farmer, and a doctor of the body and the soul. . . . The work to be done is enormous and fascinating, and should be carried out with urgency, before our old wise men are carried away by time.

Dr. Luna's recordings of Amazonian shamans singing magical incantations are available from Lux Natura, 2140 Shattuck Avenue #2196-W, Berkeley, CA 94704; catalog free. These songs were recorded during Peruvian and Colombian ayahuasca sessions during the last ten years.

Vegetalismo, *by Louis Eduardo Luna, is available from the author ($20 postpaid). Write him c/o Swedish School of Economy, Arkadiankatu 22, 00100 Helsinki 10, Finland.*

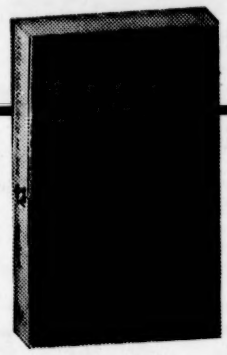
Maria Sabina: Her Life and Chants

Maria Sabina, probably one of the greatest and undoubtedly one of the humblest spiritual figures of the twentieth century, died in 1988 at age 94. Like Black Elk, she was a tragic visionary who witnessed the destruction of her prophetic tradition — as if Mohammed was also Ishi, or Ezekiel was also the last of the Mohicans.

On June 29, 1955, in her dirt-floored hut in the village of Huautla de Jimenez, Maria Sabina invited banker and amateur ethnomycologist R. Gordon Wasson to participate in a healing ceremony of unknown antiquity — a mushroom velada. *Wasson returned with Albert Hoffman, the chemist who had discovered LSD. He also published the story of the "magic mushroom cult" in* **Life**. *Ten years after that, so many gringos descended on the village (including John Lennon and Bob Dylan, among others, according to her obituary in the San Francisco* **Chronicle**) *that the Federal Police once surrounded the tiny Mazatec village and arrested every zonked norteamericano pilgrim they could find.*

Tragically, the uncouth invasions that followed upon this news contributed to the extinction of the tradition. But the beauty and spiritual force comes through in the inspired translation of Henry Munn, an American who arrived with the hippie hordes, survived the bust of '67, married into a family of Huautla de Jimenez, and became a scholar of Mazatecan culture. Maria Sabina's story, as told to Huautla native Alvaro Estrada, is a remarkable autohagiography. In Wasson's words, " . . . there emerges from these pages something precious for all of us, the portrait of a person who has had a genuine religious calling and who has pursued that calling to the end of her days."

—Howard Rheingold



Maria Sabina: Her Life and Chants
Alvaro Estrada, 1981; 239 pp.
$8.95 ($10.20 postpaid) from: Ross-Erikson, Inc., 223 Via Sevilla, Santa Barbara, CA 93105

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In the days that followed, when we felt hungry, we ate the mushrooms. And not only did we feel our stomachs full, but content in spirit as well. The mushrooms made us ask God not to make us suffer so much. We told him that we were always hungry, that we felt cold. We didn't have anything: only hunger, only cold. I didn't know in reality whether the mushrooms were good or bad. Nor did I even know whether they were food or poison. But I felt that they spoke to me. After eating them I heard voices. Voices that came from another world. It was like the voice of a father who gives advice. Tears rolled down our cheeks, abundantly, as if we were crying for the poverty in which we lived. . . .

Maria Ana and I continued to eat the mushrooms. We ate lots, many times, I don't remember how many. Sometimes grandfather and at other times my mother came to the woods and gathered us up from the ground where we were sprawled or kneeling. "What have you done?" they asked. They picked us up bodily and carried us home. In their arms we continued laughing, singing, or crying. They never scolded us nor hit us for eating mushrooms. Because they knew that it isn't good to scold a person who has eaten the *little things* because it could cause contrary emotions and it's possible that one might feel one was going crazy.

Shamanism, Colonialism, and the Wild Man

Michael Taussig has subtitled his study of atrocity and vision-seeking in the Putomayo drainage of southern Colombia "A Study in Terror and Healing."

The first part of this scholarly and yet intensely emotional book deals with terror, specifically the clash of cultures and cultural images that unleashed the genocide of tens of thousands of Amazonian Indians, who were humiliated, tortured, and murdered by the "civilizing" minions of the Amazon Rubber Company, which was really nothing more than a criminal cabal of British bankers and the Peruvian capitalist and mass murderer Julio Cesar Arana.

The book's far longer second half deals with Taussig's own experiences with the hallucinogen yage *(also known as* ayahuasca*), Indian healers, and the social psychology of healing and sorcery. Taussig, a native of Australia who has worked as a psychologist and is now a professor of anthropology at the University of Michigan, has taken a bold step by making the yage intoxication the centerpiece of his book. By making it clear that he took yage repeatedly with his curandero friends, he hurls down a gauntlet to the pompous notion of "objective" anthropology with its faint stench of whiteman's burden. Objectivism where ecstasy and shamanism are concerned is operationally useless. If Taussig's work is emulated, then the way will be clear for an involved and even moral anthropology that is no longer enslaved by the secret fantasy of white male superiority.*

—Terence McKenna

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After an hour or so Santiago swung out of his hammock and began vomiting. The sound of his slow gurgling retching filled the room, a waterfall of man expending itself. He wiped his lips clean and beat his chest and legs with *ortiga* nettles. People were stirring in the room. He began to sing, then to retch again, then sing once more. Perhaps he was singing what he heard — what the spirits of *yage,* the *yage*-people, were singing. The sounds to me were like those of the forest at night: rasping, croaking frogs in their millions by gurgling streams and slimy, swampy ground. As the waters and the wind rush faster, so did the pace of the song. The curing fan, "wind of the forest," was a blur of rustling motion. That rifle-shot crack of the tongue splintered the quavering air which the raspy voice poured into the cascading shadows. Santiago was curing Don Arcesio's little daughter of the fear, the *susto* she suffered when she got a thorn of a *chonta* palm in her heel. Her parents extracted it all except for the black tip, which receded farther and farther. Two days later her whole leg started to hurt. She became demented, they said, screaming that the spirits of the dead were coming into her body and taking her over. "Evil wind — *mal aires* — spirits of the dead . . . " mumbled Santiago, explaining to me that when a splinter gets into your foot like that in the forest, *mal aires* can enter too. That's why the forest in the Putumayo is dangerous, he said.

Shamanism, Colonialism, and the Wild Man
Michael Taussig, 1987; 517 pp.
$29.95 ($31.70 postpaid) from University of Chicago Press, 11030 S. Langley Avenue, Chicago, IL 60628; 800/621-2736 (or Whole Earth Access).

Tobacco and Shamanism in South America

In its profane form, tobacco is the only sacramental herb available in every human community on earth, from corner stores to jungle tiendas to the remotest trading post in Uzbekistan. Yet no more than a small handful of the hundreds of millions of tobacco addicts realize that their favorite drug was (and is) the main sacred herb for many indigenous cultures in the Western Hemisphere. The cultural context of botanical medicine underlies the contrast of tobacco smoking as filthy habit vs. *ritual prayer. This book, part of Yale's "Psychoactive Plants of the World" series, explores tobacco as a tool for shamanic healing and visionary intoxication, opening a surprising window on these little-known aspects of tobacco use. The ethnopharmacologic treatment includes an intriguing physiological explanation for the shaman's report of paranormal vision ("nicotine ablyopia-altered optic scotoma"): the magical power of "seeing" induced by prodigious consumption of huge cigars is revealed to be a product of lifelong nicotine narcosis which literally changes the way the shaman sees the world.*

—Rob Montgomery

Tobacco and Shamanism in South America

Johannes Wilbert, 1987; 294 pp.

$30 ($32 postpaid) from Yale University Press, 92A Yale Station, New Haven, CT 06520; 203/432-0940 (or Whole Earth Access).

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Little needs to be said here about the extraordinary effectiveness of nicotine as an insecticide and vermifuge. Nicotine is a most powerful insect killer; some 8 percent of the insecticides in tobacco are transferred into the mainstream smoke Indians use, among other methods, to fumigate insects. . . .

Known in the Western world as an insecticide since 1690 (McIndoo, Roark, and Busbey 1936), tobacco was found to have been used by South American shamans in that capacity at least as early as 1641, when Tarairiu shamans were observed to fumigate maize "seeds with tobacco smoke to enhance their fertility."

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In the course of an all-night performance one male shaman was observed to have consumed forty-two industrial cigarettes and about one hundred native cigars.

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[Testimony of an Aguaruna vision seeker]: After receiving the clyster my belly began to burn; it left me unconscious and dead. I had hardly come to, when I drank more tobacco juice and died again. On the way toward the House of Rest, I woke up and drank some more tobacco juice which had been placed for me out there. I walked, and drank tobacco juice again. Then, shortly before reaching the House of Rest my mind was opened and Payag [the comet] revealed himself to me.

Jivaro smoke blowing.

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As is often the case, Western observers, judging from their experience with Virginia blends, tend to underestimate the potency of tobacco taken by Indians in ritual context.

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It is important to remember that the Warao Indians cannot grow tobacco in the swamps of the Orinoco and that they rely entirely on importing the drug from Indians and peasants from beyond the boundaries of the Orinoco Delta on the mainland and the island of Trinidad. In traditional times trading expeditions were infrequent and uncertain, so that the spirit's (shaman's) fear of anticipated craving and withdrawal anxiety was well founded and proportionate to the state of "maturation" which his corporal spirits had attained (that is, the more nicotine-addicted he had become). Consequently, the need to assure himself of a steady supply of the drug was one of the shaman's principal preoccupations, and motivating his people to manufacture trade goods and to carry out the dangerous overland and overseas trading expeditions was foremost in his mind.

Tucano man seated on ceremonial bench holds ritual cigar with cigar holder.

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Preparation of [tobacco juice] takes place in a gourd some three inches long with "a ¾-inch hole cut in the side and another bored up through the stem into the gourd" (Farabee 1918:46). In it minced tobacco is steeped in water for some time and then stirred with a stick. For self-administration of the drug, the user places the hollow stem of the gourd in the nose and, bending his head backward, lets the liquid trickle down the nasal passages. Among the Wapishana, shamans absorb tobacco juice in this fashion during ritual performances and curing seances.

American Spirit Natural Tobacco

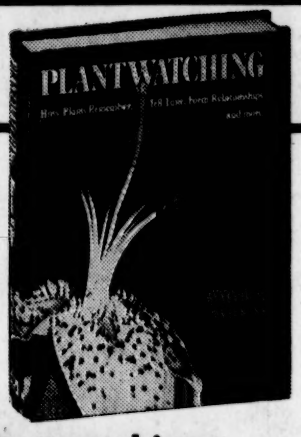
No preservatives, no additives, just 100 percent Virginia tobacco. They're not at all harsh and taste a lot like Canadian cigarettes, which are also Virginia tobacco.

For two bucks they'll send you a swell sampler package and lots of info, including testimonials from people who quit smoking using their product. *—Kathleen O'Neill*

American Spirit Natural Tobacco

Sample package (1 pack ea. filter-tip and non-filter cigarettes; 1 pouch pipe tobacco)

$2 from Santa Fe Natural Tobacco Company, P. O. Box 1840, Santa Fe, NM 87504.



Plantwatching
(How Plants Remember, Tell Time, Form Relationships, and More)
Malcolm Wilkins, 1988; 207 pp.
$29.95 postpaid from Facts on File, 460 Park Avenue South, New York, NY 10016; 800/322-8755 (or Whole Earth Access).

Plantwatching

Deceptive title here for a fascinating book. Who is doing the "watching" is actually the author, a botany professor at Glasgow University. Plant physiology is his major passion. He's good at explaining, and photographing, the mechanics of how plants survive and thrive, and at integrating the big picture with what causes it to happen on a cellular level. In this book, the color photos of seeds germinating in Petri dishes and the diagram of the Krebs cycle won't scare or bore a non-scientist away. This is a first-rate piece of public relations for the ingenuity and resilience of the plant kingdom. —*Richard Nilsen*

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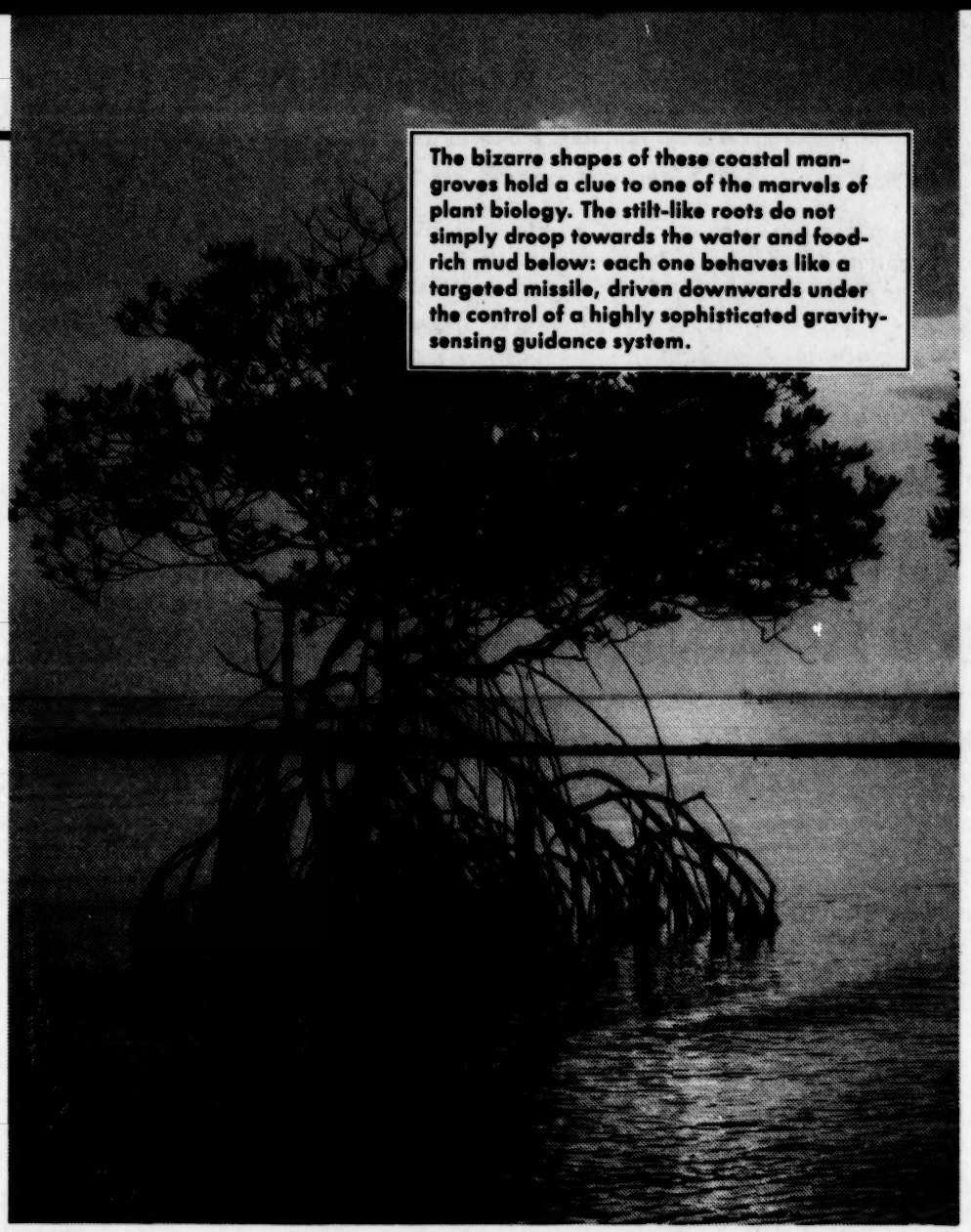
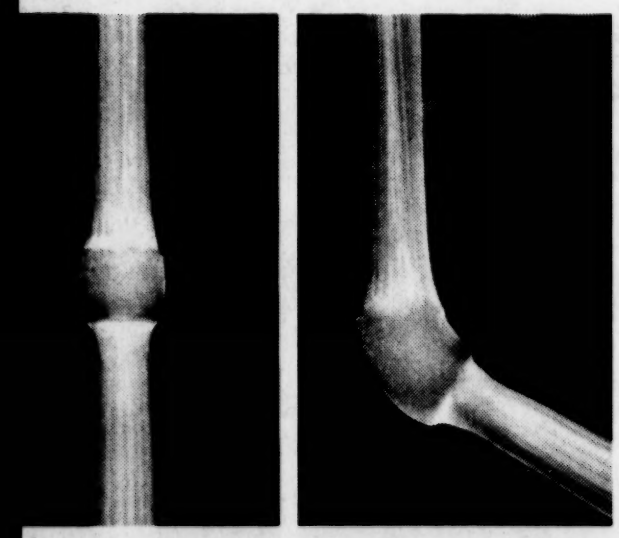
Plants grow and develop in highly organized ways. They generate enormous forces, which can destroy roads, buildings and pavements; they constantly sense their environmental conditions of light, temperature and gravity; they measure time; some of them can count, some have a memory and some have a sense of touch; they feed, respire and absorb nutrients in a selective way from the soil; they recognize one another when brought into physical contact, and in many cases they move about. They also have systems to combat infection, while many are able to enter into mutually advantageous relationships with one another and with certain kinds of bacteria and fungi. In addition, they have the remarkable property of being able to regenerate themselves from their smallest components — single cells — even though these cells may be taken from a highly specialized organ such as a root or petal.



The bizarre shapes of these coastal mangroves hold a clue to one of the marvels of plant biology. The stilt-like roots do not simply droop towards the water and food-rich mud below: each one behaves like a targeted missile, driven downwards under the control of a highly sophisticated gravity-sensing guidance system.



As long as a grass or cereal stem remains upright, there will be no growth at all at the swollen leaf sheath bases or nodes. However, if the stem is knocked over the cells on the lower side of the node will start to grow, producing the familiar 'elbow' bend that will return the upper stem and ear to the normal upright position and allow the ear to ripen.

Caudiciform & Pachycaul Succulents

Some plant collectors have a taste for the grotesque; they seek plants for use as sculpture with bizarre, exotic overtones. Rowley's book is a review and aesthetic guide to the relatively new cult of caudiciforms and pachycauls. Sensuous photographs fuel a collector's desire, while the function behind the plants' drought-adapted forms is explored. This is not a dry, scholarly work; Rowley's style has lightness and humor. For anyone who likes plant "globs," this book is a joy. —*Tony Burgess*

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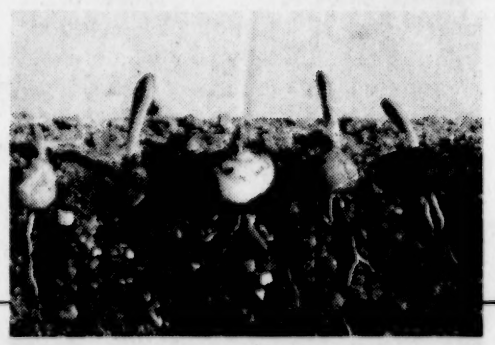
It had just rained, and strange things happen when a long drought ends in Africa. And here, out of the flat, featureless sand were emerging curious, soft, green, club-shaped growths 2 to 3cm. long reminding me of nothing so much as a creature from an underwater film that vanishes from view when disturbed. But these did not vanish, even when frequently touched. My squeal of amazement prompted Harry to take a photograph, not realising that he had preserved the very instant of discovery of a new species: *Albuca unifoliata* Rowl.



Insect-Eating Plants

Not all plants are vegetarians. Here's an explicit, practical manual on how to investigate, grow, and maintain members of one of the more curious sects in the plant world: Veggies That Eat Meat. (Open wide for your fly-burgers, little plants!) Good book. Offers windowsill Green-solidarity for us unreformed carnivores. —*Kevin Kelly*

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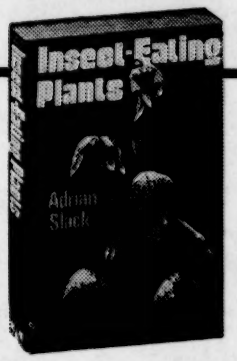
Surprisingly, there are even those [plants] which will supplement their insectivorous diet with small reptiles, scorpions and rodents, which in one species even includes rats!



Insect-Eating Plants
(And How to Grow Them)
Adrian Slack, 1988; 172 pp.

$19.95 ($21.95 postpaid) from University of Washington Préss, P. O. Box 50096, Seattle, WA 98145-5096; 206/543-4050

Margaret Mee: In Search of Flowers of the Amazon Forests

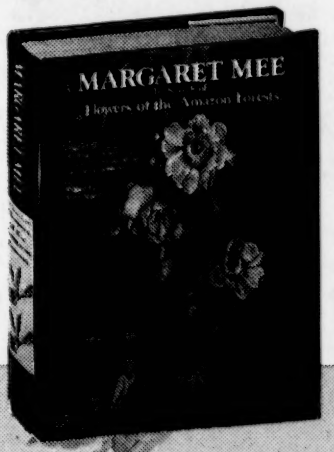
The subtitle of Margaret Mee's book is "Diaries of an English artist reveal the beauty of the vanishing rainforest." Mee's passion was rainforest flowers: observing them, painting them, collecting them for preservation and propagation. In the 1950s she saw the threat posed to the beauty and diversity of the Amazon, and she determined to paint a lasting record of the forest being so deeply disrupted by the modern appetite. Her journeys, each months long, carried her through exquisite moments of paradise, hellish sicknesses and danger, daily life with different tribal groups, the pros and cons of mission life, and the ecstatic discovery of rare or even unknown plant species. She continued to delve into the wilderness until she died recently at age 79.

A visually stunning book, ***In Search of Flowers of the Amazon Forests*** *is the description of her fifteen challenging expeditions over thirty-two years, including long excerpts from her diaries, and interspersed with excellent full-page reproductions of her watercolors, as well as sketches and photos of places and characters portrayed in the accounts.*

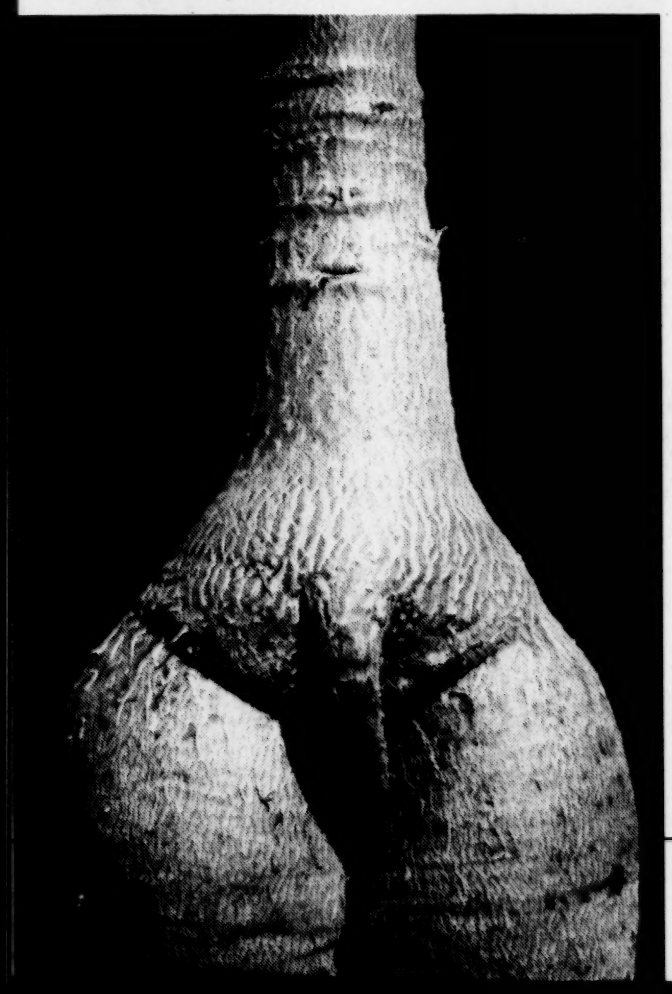
I found the book a very good read, hard to put down, an education in its detail about daily life among the various inhabitants of such an exotic ecosystem. Mee shows by example how paying attention to the minutiae of nature is its own reward. Moreover, her life and her work stand as an inspiring model, and a challenge: in our search for meaningful work, we must have the courage to do what moves our hearts, however quirky one's own interests may seem, and then let our voices be heard. We are never too old. It is not altogether too late. —*Kat McKenna*

Margaret Mee: In Search of Flowers of the Amazon Forests
Margaret Mee, 1988; 303 pp.

$39.50 ($42 postpaid) from Antique Collectors' Club, P. O. Box 301367, Portland, OR 97230-1367; 800/637-0199



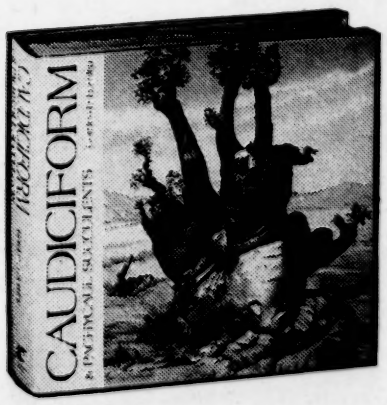
Neoregelia leviana **(Bromeliaceae), known only from Margaret Mee's collection (Rio Negro, 1964).**

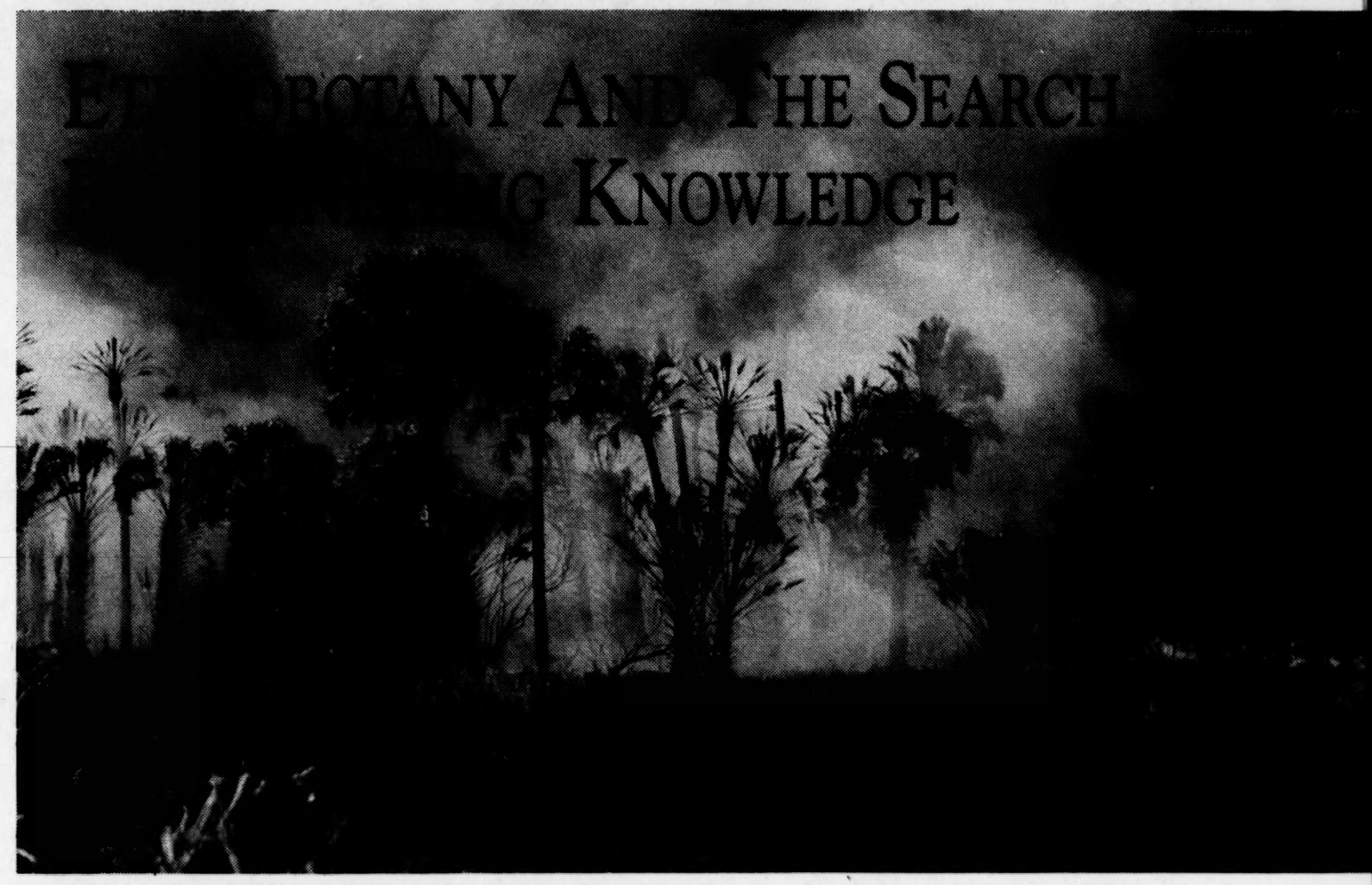


Adenium obesum **caudex.**

Caudiciform & Pachycaul Succulents
Gordon D. Rowley, 1987; 282 pp.

$65 ($68.50 postpaid) from Strawberry Press, 227 Strawberry Drive, Mill Valley, CA 94941





ETHNOBOTANY AND THE SEARCH FOR KNOWLEDGE

BY HOWARD RHEINGOLD

BEFORE MEDICAL RESEARCHERS PAID attention to an old folk tradition and extracted quinine from the bark of cinchona trees, many people died needlessly from malaria. Perhaps similar words will be said about cancer someday . . . unless that cancer cure is never discovered because the tropical tree that produced it became extinct yesterday or the last shaman who knew where to find it died this morning. Does a plant-derived treatment for AIDS or Alzheimer's disease exist today, unknown to modern science, in a previously remote forest slated for bulldozing tomorrow? Whenever I think about it, I smell a vast, ancient library burning.

The mid-morning jungle, green on green, full of light and birds, is a peculiar place to think about burning libraries. But a catastrophic loss of knowledge, dwarfing the conflagration at the library of Alexandria, is taking place in the jungles and old-growth forests. Plant medicines for the body, mind, and soul are becoming extinct at an alarming rate as their host environments are exploited or destroyed. And the people who know how to use the healing plants, the heirs to empirically based, highly pragmatic traditions thousands of years old, are dying too, without leaving successors; those who would have been the apprentices to the remaining elders, the potential heirs of the orally transmitted body of knowledge, are themselves dying or Westernizing even faster than their ancestral habitat is disappearing.

An ethnobotanical preserve specializes in plants that are the least studied by Western scientists (and are scantily represented in the botanical gardens), but the most valued by the tribal cultures who use them. An ethnobotanical preserve isn't easy to build because ethnobotany exists at the uncomfortable convergence of immense destructive forces and cultural taboos: the genocide of indigenous people that is still taking place; the accelerating destruction of the environments that

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Known to WER *readers as journalist, raconteur, and chronicler of the high-tech revolution, Howard Rheingold shows his greener side with an essay on the importance of ancient food and plant teachers, the relationship between psychedelic shamanism and pharmaceutical research, and the tragic results of ethnocentricity and cultural taboos in Western science's approach to ethnobotanical research. Howard's stance as self-declared "extraterrestrial anthropologist" has led him from peering over the edge of meaning in his book,* They Have a Word For It *[*WER *#57, p. 3], to reportage from the fiery battlefronts of human behavior, scientific weirdness, and modern art in* Journeys to the Far Side of The Mind. *When he showed up at my ethnobotanical preserve, he confessed that "a plant sent me to talk to you." I had read his books by that time. In that context, his story didn't sound half as crazy as if it had come from anyone else. Together, strolling through a leafy sanctuary filled with rare Amazonian plant teachers, we cooked up the idea for this issue.*
—Terence McKenna

A catastrophic loss of knowledge, dwarfing the conflagration at the library of Alexandria, is taking place in the jungles and old-growth forests.

contain the majority of Earth's estimated 250,000 plant species; scientific ignorance of traditional plant-based medicine systems, often based on ethnocentric bias; the abandonment of the search for plant medicines by the U.S. pharmaceutical industry; the taboo against scientific research into plant hallucinogens.

The taboo against studying the psychological effects of plant hallucinogens is particularly crippling to those who would preserve and seek to understand traditional knowledge about beneficial plants. First, the people who know the most about traditional botanical medicine, the shamans, claim that their knowledge is derived directly from the plants as well as from their human teachers. And anyone who seeks to understand the dimensions of the shamans' healing system without understanding the place of psychoactive plants is going to miss a vital factor. Although the usefulness of plants as teachers expands beyond psychedelics to the whole range of medicinal and economic plants, it is counterproductive to ignore the living center of the shamanic plant traditions.

Botanical Dimensions was created by Kat and Terence McKenna "to collect, protect, propagate and understand plants of ethnomedical significance and their lore, throughout the world." The heart of the enterprise is a botanical garden on 19 acres of meadow and forest at 2,200 feet on the island of Hawaii, created and nurtured over the past ten years by Terence and Kat, their assistants, volunteers, and network of collectors. The McKennas and a small number of colleagues are striving to save plant species (and something more fragile than plant species) from extinction.

The knowledge held by the last of the shamans is a precious resource. In the past, research based on folk traditions led to pharmaceuticals that saved millions of lives. Gathering such knowledge in the first place must have been a painstaking and hazardous process for early generations of experimental shamans, requiring remarkable bravery as well as ironclad devotion to the experimental method in order to sift through the hundreds of thousands of plants, many of them fatally toxic, to find the ones with specifically useful effects. Which is what generation upon generation of shamans did, from the Himalayas to the Andes.

Chavin art from the Peruvian highlands, circa 1300 B.C., depicts the ritual use of the shamanic San Pedro cactus (*Trichocereus pachanoi*) that is still used as physical and spiritual medicine today.[1] Perhaps a healing tradition over 3,000 years old that is still in use should not be too lightly dismissed. The Ayahuasca cult of Amazonia is of unknown antiquity. Mayan and Aztec art clearly exalt the properties of psilocybin mushrooms. Explicit petroglyphs in North Africa reveal the existence of psychedelic mushroom cults more than 12,000 years ago. The existence of the dwindling remnants of the living mushroom cult of the Mexican Sierra Mazateca were discovered in the 1950s; prior to Gordon Wasson's discovery of Maria Sabina in Hautla de Jimenez, the antiquity and extent of sacred plant cults was unknown to scientists and scholars of the industrialized world. Western medicine is a few centuries old, and until recently dismissed the mind-body healing aspects of botanical psychedelic shamanism with words like "witch doctor." Nevertheless, there is ample evidence that herbal shamanism was an experimental form of psychosomatic medicine, a form of science as well as a religious subculture.

The invisible but precious aspect of these traditions is the body of knowledge acquired by each shaman through a lifetime of learning from plant and human teachers. The pioneering ethnobotanauts who survived their research in do-it-yourself pharmaceutical analysis passed along the best of their knowledge to their apprentices. A plant-using shaman is far more than a witch doctor who gets wigged out on drugs; he or she is a healer, experimentalist, and psychopomp. The shaman's knowledge was a kind of cultural library for the tribal group. Each shaman learned, applied, and passed along knowledge of botany and bonesetting, hunting lore and agronomy, pharmacy and storytelling, spiritual and social wisdom vital to the welfare of the tribe, knowledge related not only to healing but to warfare, to relocating the village or settling family disputes, to any of the critically important decisions that maintain the life of the culture in relationship to their natural environment. The plant teachers were used for guidance and decision-making and to remain in balance with the natural world. ►

Howard Rheingold

The slender plant next to Terence McKenna will grow into a staggeringly potent tree. Columbus' expedition encountered hallucinogenic athletes, the Taino of Hispaniola, who used a snuff compounded from the seeds of *Anadenanthera peregrina* to communicate with the spirit world. More recent studies revealed that the cult, of undetermined but significant antiquity, had spread from Venezuela to the Caribbean, and was known as *cohoba* or *yopo* as far away as Brazil and Argentina. Dimethyltryptamine (DMT), 1.2-dimethyl-6-methoxyterahydro-β-carboline, and several other extremely powerful psychedelic chemicals make this botanical brew far stronger than the hallucinogens known to Western enthusiasts. The legitimate researchers and abusers of LSD and other synthetic hallucinogens, heirs of Albert Hoffman's bicycle ride, undoubtedly would look like kiddies playing with toy sailboats from the perspective of the psychic sailors of the yopo cult, who steered their fragile craft through mindstorms inconceivable to contemporary urban acidheads, to retrieve something precious and vital.

In the past, when Western medical researchers did pay attention to this knowledge, the payoff was spectacular. As this article is being written, one of the most promising experimental AIDS drugs, known as "GLQ223," is derived from the root of a Chinese plant in the cucumber family. Yet, despite the well-known success of other "folk medicines" such as digitoxin and digoxin (heart failure), ergotamine (migraine), salicin (inflammation and pain), morphine (pain) vincaleukoblastine and leurocristine (Hodgkin's disease and childhood leukemia), and more than 100 other antibiotics, antitumor agents, immune-system stimulants, tranquilizers, sedatives, contraceptives, anaesthetics, laxatives, and pain relievers, the United States has no commercial or government effort to discover and develop new drugs from higher plants.[2]

One of the reasons for this dearth of commercial interest in the U.S. is the regulatory structure that makes it preferable for pharmaceutical companies to pursue "rational drug design strategies" in search of new, synthetic (and more easily patentable) drugs; another reason is that drug firms failed in their early attempts at discovering new medicines from plants because of a lack of interdisciplinary cooperation and the lack of inexpensive, portable, accurate bioassay technologies.[3] All of these obstacles can be surmounted, particularly if the current wave of interest in natural foods and plant medicines raises the economic stakes for the American drug market. And other countries, notably Germany and China, are already engaged in vigorous ethnobotanical R & D. But while the scientific bureaucracies clear up their political differences, and the vendors and regulators stumble toward a policy that might encourage research and preservation, the body of knowledge and the associated biomass are disappearing.

Plants have never captured the public imagination the way whales or baby seals do — the plant division of the National Wildlife Federation was created only in recent years, in response to the urgent appeals of ethnobotanist Mark Plotkin. Trees are the sexiest plants, and while the loss of the great forests continues, it no longer continues unprotested or uncontested. Some organizations are trying to preserve some priceless remainder of the environment in which known useful plants and tens of thousands of undiscovered others still live; other organizations are trying to preserve indigenous peoples and their cultures. But the specific pursuit of ethnobotanical knowledge is a grueling task, and at the heart of it is a subject that happens to be taboo in our culture at this time — direct confrontation with spiritual and medical knowledge through the ingestion of consciousness-expanding plants.

As Terence McKenna pointed out, machete in hand, while we walked along the jungle path surrounding

the preserve: "No one is preserving this information. Or precious few of us, anyway. It's professionally dangerous to have anything to do with this information."

He was pointing at a brown liana, as thick as my arm in places, coiling its way up tree trunks, limbs, and around itself in heliocentric pilgrimage to the jungle canopy. The "dangerous information" McKenna was mourning encompasses a lot of territory. The vine itself, *Banistereopsis caapi*, is a key ingredient in the sacramental infusion used by an old medical, religious, psychiatric, and social system — the ayahuasca cult. The little that is known about the psychosocial system that has grown up around the plant over thousands of years is intriguing; legends and anecdotal reports hint at direct perception of knowledge regarding diet, medicine, spiritual growth and personal conduct — the plant itself as the teacher/healer/psychopomp.[4] Other persistent rumors concern "shared states of mind" and self-diagnostic capabilities.[5] In the ayahuasca cults, the medicine, the plant, and the teacher are all the same entity.

McKenna also was referring to the incalculably larger collective loss of knowledge regarding thousands of medicinal, economic, and spiritual plants that is taking place. The knowledge that is slipping away from us concerns the foundations of human well-being — health, sanity, imagination, social harmony. And plant-based medicine is not simply a New Age nostrum (although the best place for an American to obtain herbal remedies is the nearest upscale natural-foods boutique). According to the World Health Organization, approximately 70 percent of the world's population rely on the use of plant extracts within the context of "traditional medicine" as their primary source of health care. At the same time, American consumers paid more than $8 billion in 1985 for prescriptions whose active constituents were extracted from plants.[6]

In the early 1970s, with no concerted effort by any pharmaceutical company, government, or international body, Terence McKenna was recruited directly by the plants themselves to export, preserve, and propagate them. A University of California graduate with an interdisciplinary degree in conservation of natural resources, he set out in the first of several South American expeditions in search of rare ethnobotanical

A Fruitless Way of Knowledge

How not to do ethnobotanical research

One of the people they sent to my house was an American botanist collecting for an American pharmaceutical firm. I thought he had a strange way of working, but he assured me that it was the only proper one. "You're wrong to expect anything of value from Indians," he told me. "My advice to you, as a friend who has been in tropical botany for years, a friend who knows, is 'give it up!'" You'll get nowhere fooling around with Indians. How can they know anything about medicine? They're illiterate!

"The big companies are out to make money. Do you think they'd hire some ignorant savage as a consultant? No, they hire me, and at a damn good price, too."

He agreed emphatically that the jungle was full of undiscovered medicinals of tremendous value. "But you've got to keep this ethnic stuff out of it; that's nothing but superstition. Me, I'm a scientist and I work scientifically."

His method was to wander through the woods gathering everything he saw that belonged to any plant family that included some species which had physiological activity. If field tests showed one to have any alkaloids or other interesting compounds, it was gathered in quantity and shipped to the laboratories in the States. And there, the pharmacologists would make analyses of the components and then try to find out what they might be good for.

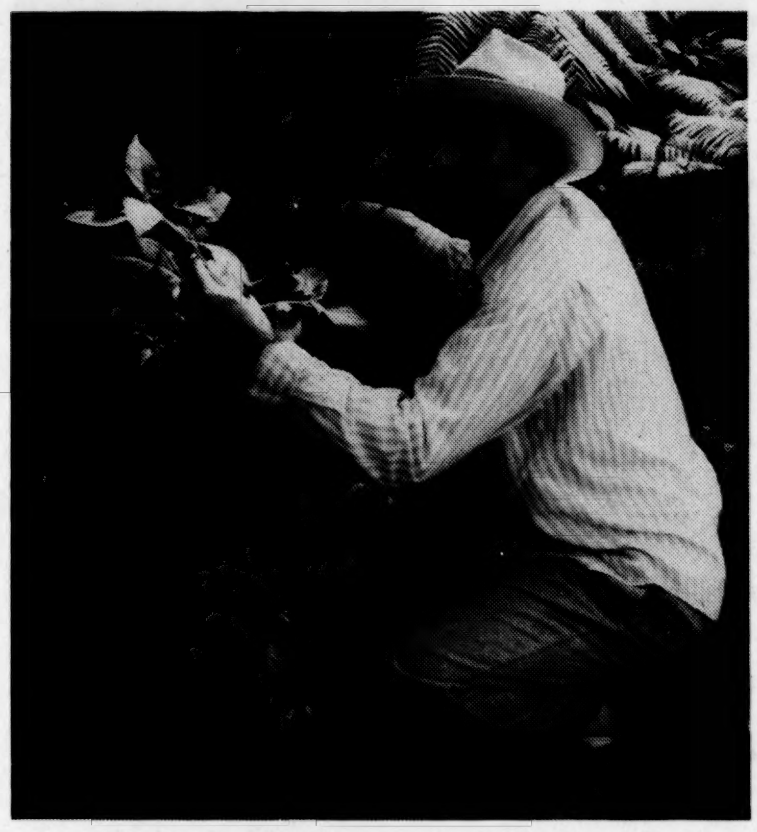
"Don't you get a certain number of false positives on the field tests?" I asked, having learned that the alkaloid test, for one, is not always reliable.

"Oh sure, now and then. But they can catch that in the States and toss out the batch." It seemed to me a curiously roundabout and extravagant way to work. I was not surprised to hear, a few years later, that little of value had been found and the project had been abandoned. It must have cost plenty, though, while it lasted. I doubted that it had enhanced the value of jungle medicine in the minds of the pharmaceutical industry's chiefs. Oh dear!

—Nicole Maxwell,
Witchdoctor's Apprentice, 1975.

Where the Gods Reign

A Kofan medicine man rasping the bark of a yoco stem to extract a caffeine drink. In the Colombian Amazon.



Terence McKenna

The leaves in the author's hand belong to a healthy specimen of one of the least understood and most endangered plant entheogens. There are no more than a couple dozen old family plots of *Salvia divinorum* left in Mexico's Sierra Mazateca. Known to the Aztecs as *Pipiltzintzintli* and contemporary Mazatecas as *Ojas de la Pastora* ("leaves of the shepherdess"), it does not grow wild, and Mazatec legend has it that the plant was brought there by a special traveler, long ago. The chemical constituents are so fragile that it eluded analysis for decades. Within the past few years, divinorines have been isolated, complex diterpenoids that are unrelated to all other known psychedelic chemicals, but which are structurally related to forskolin, found in *Coleus forskolii* — the only known stimulator of a key intracellular messenger in nerve cells.

Returning to Plants for Healing Medicines

Estimates of the number of higher plants that have been described on the face of the Earth vary greatly — from about 250,000 to 750,000. How many of these have been studied as a source of new drugs? This is an impossible question to answer for the following reason. The National Cancer Institute in the United States has tested 35,000 species of higher plants for anticancer activity. Many of these have shown reproducible anticancer effects, and the active principles have been extracted from most of these and their structures determined. However, none of these new drugs have yet been found to be safe and effective enough to be used routinely in humans. The question then arises, could any of these 35,000 species of plants contain drugs effective for other disease states, such as arthritis, high blood pressure, acquired immune deficiency syndrome (AIDS), or heart trouble? Of course they could, but they must be subjected to other appropriate tests to determine these effects. In reality, there are only a handful of plants that have been exhaustively studied for their potential value as a source of drugs, i.e., tested for several effects instead of just only one. Thus, it is safe to presume that the entire flora of the world has not been systematically studied to determine if its constituent species contain potentially useful drugs. This is a sad commentary when one considers that interest in plants as a source of drugs started at the beginning of the nineteenth century and that technology and science have grown dramatically since that time.

The 119 plant-derived drugs in use throughout the world today are obtained from less than 90 species of plants (Farnsworth et al. 1985). How many more can be reasonably predicted to occur in the more than 250,000 species of plants on Earth? . . .

Recently we analyzed information on the 119 known useful plant-derived drugs to determine how many were discovered because of medicinal folkloric information on the plants from which they were isolated. In other words, what correlation, if any, exists between the current medical use of the 119 drugs and the alleged medical uses of the plants from which they were derived? Seventy-four percent of the 119 chemical compounds used as drugs have the same or related use as the plants from which they were derived. This does not mean that 74 percent of all medical claims for plants are valid, but it surely points out that there is a significance to medicinal folklore that was not previously documented.

Thus, in my opinion, future programs of drug development from higher plants should include a careful evaluation of historical as well as current claims of the effectiveness of plants as drugs from alien cultures. Such information is rapidly disappearing as our own culture and ideas permeate the less developed countries of the world where there remains a heavy dependence on plants as sources of drugs. . . .

Higher plants have been described as chemical factories that are capable of synthesizing unlimited numbers of highly complex and unusual chemical substances whose structures could escape the imagination of synthetic chemists forever. Considering that many of these unique gene sources may be lost forever through extinction and that plants have a great potential for producing new drugs of great benefit to mankind, some action should be taken to reverse the current apathy in the United States with respect to this potential.

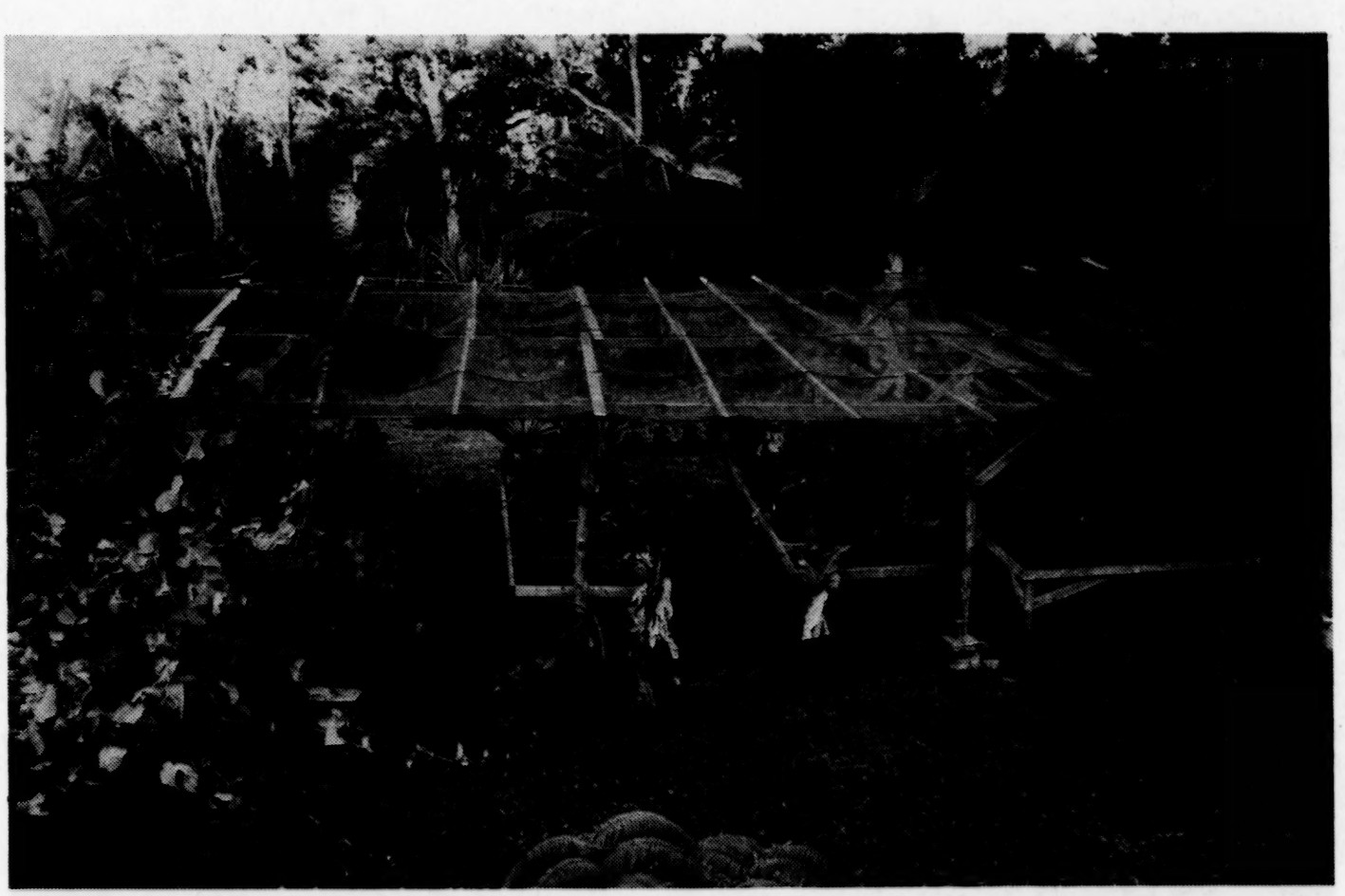
—N.R. Farnsworth, 1988

specimens. An expedition to a remote tributary of the Putomayo river in the Colombian Amazon led to his first experiences with the mushroom *Stropharia cubensis*, which he and his brother Dennis succeeded in cultivating after several years of effort. In 1976 he married another enthusiastic amateur ethnobotanist, Kathleen Harrison, and by 1977 they had found the land in Hawaii — three hours by machete from the nearest road — and started moving their specimens there.

Kat was in Thailand at the time I visited, in search of the fabled *kratom* (story p. 32). Terence and his charming young son Finn took me for morning walks along the trail that encircled their property, pointing out specimens of the more than 60 imported species that were growing there at the time. Shortly after I returned to the mainland, 50 new species arrived from South America, and through an arrangement Kat had made with a botanical garden in Bangkok, new Asian specimens began to arrive. The transplantation process is laborious, because the soil layer is very thin. For each specimen, a hole has to be dug in the rocky lava soil, and soil amendments have to be hauled in and mixed, before the plant can be placed in the ground. Terence explained the process of obtaining a plant, while we walked through the heart of Botanical Dimensions.

"When you bring out plants, you bring out dozens of plants at a time, consisting of many species and many specimens of each species," he began. "You need a phytosanitary certificate, which you obtain from the U.S. Department of Agriculture. But you need a different collection of papers before you get to that point. The process begins when you read about a plant of interest in some ethnobotanical paper, or hear a rumor of a plant. Before you mount an expedition, you need letters of support from a botanist at one or more universities, attesting to your status as a skilled, if amateur, ethnobotanist. If you know what you are doing, this should be possible to do; keep in mind that ethnobotany is one science where many of the major contributions have been made by well-informed amateurs."

As McKenna explained it, the advance paperwork is just the first step in a bureaucratic labyrinth: "After obtaining seeds, cuttings, or (preferably), root stock of the sought-after plants, we arrive in the capital city of Country X, preparing to return home. After insuring that proper botanical identification is provided to smooth the export and import process, our first call is on the botany department of the national university, where we give half of our specimens to the chairman of the department. He, in turn, writes us a friendly cover letter which we take over to their plant export people, who then, after delays, agree that we can depart



Howard Rheingold

The shadehouse is where imported plants end up after an odyssey via backpacks, canoes, bureaucracies, aircraft, and four-wheel-drive vehicles that may take up to a year from the time the plant is located and collected to the moment it is put in the shadehouse, nurtured with vitamins, and prepared for planting in the botanical garden. Botanical Dimensions has over 200 species, some of which are the basis of psychoactive brews, the others consisting of suspected immune-stimulants, contraceptives, economic plants, and other endangered plants used in traditional medicine. Although the majority of plants are from South America, others are beginning to arrive from Africa and Asia.

Shamans in the Service of Plants

In this manner, then [according to the beliefs of Desana shamanism], the human mind is continuously engaged in the task of fulfilling the demands of the left hemisphere. The degree to which this can be accomplished depends upon the individual's awareness of cosmic energies and upon the person's willingness to obey the moral order promulgated by shamans. The individual brain is permanently exposed to stimulations coming from the outside world, and the person must learn to interpret the many messages that are received by the brain. In addition to nature's messages, the brain is being stimulated by shamanic manipulation on many, if not all, occasions when a ritual is being performed. Indeed, shamans claim to be specialists in brain/mind relationships. The entire range of environmental sensorial stimulations, of drug use, altered states of consciousness, relaxation, and meditation constitutes a focal area of interest to the Indians, not only to shamans but to most adults who already have acquired a large body of knowledge of neurological processes by observing the effects of psychotropic drugs, together with their personal reactions to a variety of environmental stimulations.

Plants of the Gods

Maria Sabina, a famous Mexican shaman, discourses while in a plant-aided trance.

A normal natural environment, such as a forest, a riverbank, or a cultivated field, transmits certain signals, called "energies" (bogari), of which the recipient may hardly be conscious unless his awareness has been heightened, for example, by food restrictions before going to hunt. But in an enriched social environment these energies are intensified and orchestrated by monitoring devices. This control can consist of a single person, such as a shaman who speaks, recites, or sings; or it can consist of a group of coordinated dancers and singers accompanied by instrumental music; in any case, effective control will consist of the framework of traditional rules which guide the ritual. In practically all these situations the participants consume narcotic drugs, so that direct biochemical processes come to influence behavior. The chemical components of many of the plants from which these drugs are prepared are fairly well known, but the fact remains that the Indians use many admixtures and combinations, and of these and their effects very little is known. Precise dosage constitutes a vast body of shamanic learning of which, unfortunately, our knowledge is still very scanty.

Although the general nature and content of hallucinations induced by these substances have been described by several authors, these descriptions do not do full justice to the Indians' categories of perception, which are likely to cover a much wider range of states of consciousness, as well as many different intensities of imagery. I have mentioned that all intense drug experiences of the Desana develop in an enriched environment; after an initial period of deprivation consisting of sexual abstinence, dieting, insomnia, and controlled breathing, the participants are exposed to vocal and instrumental music, to the sight of bright colors, to different odors, and to scheduled lighting changes accompanied by certain prescribed motor activities. The aim of these stimulations is to induce very specific states of consciousness which correspond to, socially and individually, adaptive behavioral norms, as formulated by the left cerebral hemisphere, the spokesman of which is the shaman. By using physicochemical mechanisms and thus altering the level of sensory awareness, shamans try to activate certain potentials in one or the other hemisphere, and to trigger specific behavioral responses.

The Desana have some twenty musical instruments, mostly wind and percussion, a selection of which is played on ritual occasions. Each instrument is associated with a certain ritual, a certain time of day, a certain age-group, and a certain animal. Furthermore, the sounds of each instrument are classified by color, smell and temperature and are said to produce specific types of vibrations which, by affecting a particular part of the brain, transmit to the audience a specific, culturally coded message. For example, a particular large flute is played only by adult men; its long-drawn sounds are said to have a male odor, a very strong yellow color, and a very high temperature; the melody is said to be of a merry kind and is associated with the image of a multitude of fish running upriver to the spawning beds. The vibrations produced by the sounds are said to trigger a message which refers to child-rearing, especially to breast-feeding during the first year of life. Another example is this: a small whistle is blown by adolescent boys early in the morning when they bathe in the river before dawn. The odor of the tune is said to be male, the color is red, and the temperature is hot; the tune evokes youthful happiness and the taste of a fleshy fruit of a certain tree. The vibrations carry an erotic message to a particular girl.

And there exist other mechanisms. Shamans as curers and, in a sense, as confessors will give to their patients a hallucinogenic drug and then will ask them to describe their visions. On other occasions, people who are, or were, under the influence of a drug will consult a shaman about their experiences. All this means that shamans eventually acquire a profound knowledge of the nature of altered states of consciousness and of human projective mechanisms.

—G. Reichel-Dolmatoff, "Brain and Mind in Desana Shamanism," *Journal of Latin American Lore* 7:1, pp. 73-98, 1981.

Where the Gods Reign

Banisteriopsis caapi, a liana that tends to grow in charming double helices, is one of the primary ingredients of an entheogenic potion known across a very wide territory as *ayahuasca, yage, natema, caapi, Santo Daime.* Those who know it call it "spirit vine" or "the ladder to the milky way." Its native habitat is dying out fast, and although the heirs to the pure indigenous tradition are also becoming extinct, a syncretic religion based on the brew has spread through urban mestizo populations, so the demand is growing at the same time the habitat is declining. The specimens at Botanical Dimensions were provided in 1972 by the late Timothy Plowman, promising ethnobotanist and star pupil of Harvard's Grand Old Man of the Amazon, Richard Evans Schultes. The McKennas kept the specimen alive in an aquarium in Berkeley until 1975, when it was transplanted to Hawaii. One of the key ingredients was known as *telepathine* when it was first isolated, because of persistent rumors of shared, visible, mental states, sculpted by magical songs known as *icaros.*

with all this stuff. And then they stamp it, issue reams of paper about it, and we fly out. We then arrive at Los Angeles or Miami with this carton of living plants; we leave the ordinary customs processes and go directly to the Department of Agriculture people, who gas all the plants, wash away any soil that may be clinging to their roots, and give them back to us, somewhat the worse for wear. Then we rewrap them, repackage them, and air express them to their destination, where they are immediately fed vitamins, put into potting soil, and babied along. Perhaps half the original specimens survive this process, which can take up to a year. Then we get to find out if they can actually adapt to the new environment, a process that can take several years, and if they thrive we propagate them."

Although a network of botanists, anthropologists, chemists, psychotherapists, and psychologists are trying (discreetly) to learn something about the use of these plants and the nature of their active ingredients, the taboos against overt psychedelic research make it difficult to organize the kind of broad interdisciplinary effort needed to approach this body of knowledge and medicinal substances.

Botanical Dimensions reminds me of the monasteries of the Dark Ages in Europe, in which monks carefully copied manuscripts they didn't understand, century after century, keeping the information together until the Renaissance lifted the taboos on classical wisdom. "We're just trying to keep the plants alive through the current dark age, until a future society, more enlightened than the present one, takes an unbiased look at their potential," Terence said, back at the shadehouse, after our first walk through the property. The great green library is burning. But at least some determined amateurs are trying to save a remnant of the old knowledge before it all goes up in smoke or smothers in concrete. □

Footnotes

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R.E. Schultes and A. Hoffman, 1979. *Plants of the Gods,* New York: McGraw-Hill, p. 126. ■

. . . of the jungle

This lovingly amateurish hand-stapled catalog reflects the nature of the operation — knowledgeable plant devotees who distribute seeds and rooted specimens of legal ethnobotanical plants. Don't ask them for information about using the plants. The law frowns on that. Ethnobotanists who quietly supply major arboretums around the world with specimens of rare, useful plants, they see this catalog as a way of taking direct action in dire times.

—Howard Rheingold

•

As always, the plants remain the real teachers. They are heuristic by nature, enabling seekers of truth to find their own answers. Growing a plant can be a profound spiritual exchange. . . .

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Brunfelsia jamaicensis, (Solanaceae). Endangered species from cloudforests in Jamaica's Blue Mountains. Long tubular corollas with narrow necks and wide undulating edges. One of the most fragrant of all scents, exhaled in little breaths during the evening. Reminiscent of vanilla and clove. We keep several in 1 gallon pots, rotating the ones in bloom into the bedroom for pleasure making. treelet $22.00

•

Hydrocotyle asiatica ''Gotu Kola,'' (Umbelliferae). Tropical creeping herb famed as Chinese longevity and brain tonic. Good terrarium specimen or as groundcover for plants in containers. Spreads vigorously with warmth, sun and moisture. Commercial Gotu Kola often is dredged from open sewage ditches in India, so home-grown is highly recommended. Easy to grow. plant $10

•

Iochroma sp. ''Borrachero'' (Solanaceae). Scandent shrub with electric-blue/violet, tubular flower clusters. Elder shamans of Colombia's Sibundoy Valley will seldom speak of this sacred medicinal, yet they all have carefully tended bushes in their secret gardens. Outstanding specimen plant of significant ethnopharmacologic status. treelet $15.00

. . . of the jungle
Catalog **free** from P. O. Box 1801, Sebastopol, CA 95473.

Where the Gods Reign

This book is a gift from the heart of a great Amazon explorer, the twentieth century's pre-eminent ethnobotanist. Dr. Richard Evans Schultes, Director of the Botanical Museum at Harvard, lived fourteen years during the 1940s and 1950s in the northwest Amazon Basin, searching for and identifying medicinal and psychoactive plants and taking photographs of the people who dwell in that forestworld. This book is filled with his sensitive images from the daily life of a culture now slipping away. Each full-page photo is accompanied by an illustrative quote from one of the other luminaries who has explored the Amazon, with a descriptive paragraph by Dr. Schultes to bring it closer to the reader. Looking at the book, I feel amazed at the beauty and balance those people maintained only forty years ago. Fragile indeed, as we now know.

—Kat McKenna

Where the Gods Reign
Richard Evans Schultes, 1988; 306 pp.
$20 ($22 postpaid) from Synergetic Press, P. O. Box 689, Oracle, AZ 85623; 602/622-0641

The ''devil's garden,'' Puerto Limon, Rio Caqueta, Putumayo.

▲

There are in the western Amazon forests isolated areas where almost nothing but *Selaginella* will grow, with the exception of small trees or bushes of the Coffee Family which are botanically known as species of *Duroia*. These rather open spots are called ''devil's gardens'' by the natives. They remain a scientific mystery. It has not been determined what causes the inability of the surrounding forest to thrive where *Duroia* is abundant. *Duroia* is usually inhabited by ferocious ants, the explanation of some of the Indians. Others believe that the *Duroia* exudes or exhales something toxic to most other vegetation. Whatever the cause, there is here an interesting and unsolved ecological enigma.

Amongst numerous tribes in the Colombian Amazon, there is a curious custom of using the fresh, pliable bark of *Duroia,* bound tightly around the biceps, to induce a cosmetically esteemed ornament. The bark is caustic and raises blisters. Several days following the blistering a blue-black ring in the skin appears; this ring persists for a month or longer.

Hippie Ethnobotany

by Craig Dremann

RECENTLY I TALKED to a Hopi Indian girl working at the local Copy-Mat. She can't speak her ancestral language and she travels to her reservation no more than once a year. The only remaining tie to her native culture is in what she eats. She sure knows her corn.

Nowadays, there isn't much left of hippie culture except a gut attachment to a type of food hippies introduced. I can't think of anyone who began eating whole-wheat bread and then went back to white bread. While most of the folks who once thought of themselves as hippies have dropped their overt identification to hippie culture, they still partake of it by the food they eat. They eat hippie food — yogurt, carob, and so on — almost all of which was introduced into the "white-bread" culture by the original aboriginal hippie culture.

From my perspective as a seed supplier, I've noticed that cultural hippies are still the major introducers of new vegetable varieties in North America. Six or seven seed suppliers (out of an industry total of 250), all of them "alternative," collectively introduced the majority of the 1,271 new varieties of vegetable seeds in the last three years. Their (and our) customers are hippie types. I imagine that five hundred years from now about the only lasting cultural contribution that will be attributed to hippies will be the new plant foods and plant uses they introduced.

I am compiling a survey of hippie ethnobotany — hippie foods, medicines, and plant ways. Below are some of the candidates. If you have any comments or contributions, send them to me. I'll be publishing a book with my results in 1990.

Craig Dremann c/o Redwood City Seeds, Box 609, Redwood City, CA 94064.

R. Crumb

Amaranth whole grain	**Corn (non-wheat) pasta**	**Medicinal herb tinctures**	**Sesame-millet bread**
Anasazi beans	**Dried, unsulfured fruit**	**Miso**	**Sprouted wheat bread**
Apricot-kernel oil	**Falafel**	**Oils, pure essential flower**	**Tamari**
Buckwheat sprouts	**Job's tears grain**	**Organically grown grains**	**Tempeh**
Bulghur wheat	**Juice of wheat leaves**	**Quinoa grain**	**Teff flour**
Bulk dried culinary herbs	**Kefir**	**Rice flour**	**Whole wheat pasta**
Carob candy	**Kelp & seaweeds**	**Sesame butter**	**Yeast, nutritional** ■

•

Indian children are rarely, if ever, punished by their parents, yet there seems to be a deep respect for elders. This respect is especially marked amongst the boys whose keen observation follows every activity of an older brother or father. Sometimes it seems to the casual observer that the boys are given to long periods of moodiness and inactivity, but closer observation shows that the child is intent upon learning some craft or activity and that the "moodiness" is actually deep study. Hours are thus spent by a boy silently watching his father fish, and then one day, without much practice, the boy becomes an expert in his own right. This characteristic of learning by intent observation is one of the traits of the primitive Amazonian which is first to suffer when he comes into sustained contact with white men and their civilisation.

•

The number of animals tamed by the Indians and that live in or near the houses is incredible: various kinds of bird — parrots, macaws, pajuiles and many tiny birds, several kinds of monkeys, deer, tapirs, and many other animals, including boa constrictors that frequently live in the rafters and keep the houses clear of mice and rats. Most of these tamed animals are captured as very young or recently born offspring or as eggs; in all cases, they are raised in the freedom of the household and live happily with both the human inhabitants and the dogs.

Street Pharmacologist

These folks have been around since 1973, but are not as well known as they should be. You send them a sample of a drug, and they provide pharmacological analysis of it, while maintaining your anonymity. Their non-profit foundation publishes a newsletter summarizing the rough-and-ready patterns of drugs as they are used on the street.

—Kevin Kelly

Street Pharmacologist

$25/year from Up Front Drug Information, 5701 Biscayne Boulevard #602, Miami, FL 33137.

SP Lab Results — Summer 1988

ALLEGED CONTENT	ACTUAL CONTENT	DESCRIPTION	ORIGIN
methaqualone	methaqualone	white powder	North Virginia
methaqualone	diazepam	white tablet	Monmouth,NJ
Quaalude	methaqualone	white powder	North Virginia
cocaine/heroin	naphthalenol	white powder	Hialeah, FL
marijuana w/PCP	marijuana	plant material	unknown
LSD	LSD	paper square	North Bay, CA
MDMA	MDMA, MDA	white powder	San Francisco, CA
MDMA	MDMA	white powder	North Bay CA
PCP	LSD	white powder	New York, NY
unknown	no drugs detected	white powder	Gainesville, FL
unknown	acetaminophen	blue tablet	North Bay, CA
unknown	steroid	blue tablet	Pilot Mount., NC
unknown	diazepam, chlordiazepoxide	white capsule	Ft Lauderdale, FL
unknown	palmitic & stearic acid	blue/white capsule	Ft Lauderdale, FL
unknown	diethylpropion	white capsule	Ft Lauderdale, FL

The analysis service provided by SP Lab is not intended for emergency drug analysis or for use as legal evidence in court. To submit a sample for analysis, follow the procedure outlined below.

1. Wrap the sample securely in foil or plastic and place in an envelope.
2. Identify each sample with a random five digit number. Enclose a note giving the code number and any details about the sample (what it is believed to be), the effects of the drug (if someone has used it), and the city and state or country from which it was obtained.
3. Enclose $25 for each sample, preferably in the form of a money order.
4. Enclose a self-addressed, stamped envelope if you wish to receive results by mail.
5. Call Up Front at (305) 757-2566 for mailing address.
6. After about three weeks call *305-757-2566 or, Florida residents outside Dade County, call toll free 800-432-8255.* Be ready to give your code number for results.
7. Before submitting a sample, it is suggested that you call to verify the mailing address and the appropriateness of your sample for analysis. Note that SP Lab tests only for active drug ingredients. Inactive fillers, cuts, and other pharmacologically inert substances will not be identified.

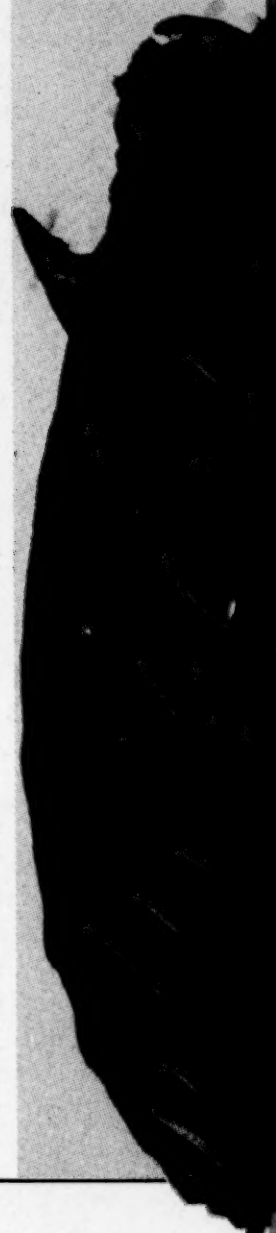
BOTANICAL PEACE CORPS

BY VERIDITAS

THE BOTANICAL PEACE CORPS is a way for the people of planet Earth to act directly to rescue at least part of one of our most precious resources from oblivion, without the need for lobbying, boycotts, picketing, politics, hierarchical organizations, or vast budgets. Our mission is to identify, collect, preserve, trans-ship, and propagate seeds and living specimens of potentially valuable rare or endangered plants. It is a truly grassroots network, but one with enormous power to accomplish things that large, traditionally organized institutions cannot do.

With the accelerating destruction of the world's tropical rainforests and other unpaved habitats has come another kind of destruction — the loss to all humankind of nutritional, spiritual, and medicinal plants used by indigenous peoples for tens of thousands of years. Saving as much as possible of the remaining traditional cultures and their habitats is an urgent, important task, and an enormous one. Saving the plants themselves is also an urgent, important task, and one that might not require government or international agencies and eight-figure budgets. It is possible that a significant number of important plant species could be saved by a worldwide network of trained amateur collectors.

A small network of "land-arks" already exists (in addition to a few sympathetic major


Drugs and Food from Little-Known Plants

The idea for a Botanical Peace Corps was catalyzed by a series of discussions among dedicated amateur ethnobotanists who are taking direct action to save valuable plants. If their efforts, and those of other small groups, could be augmented by a grassroots participation by concerned citizens, the crusade to preserve these plants and knowledge about their use could expand manyfold. The organization was designed to be leaderless and decentralized. The manifesto is accompanied by excerpts from the "wish list" of needed plants and from the field guide that will be provided to those who take up the challenge of collecting specific plants and seeds. The authors are pseudonymous, in the spirit of the organization, which focuses on collecting, shipping, and propagating the plants themselves.

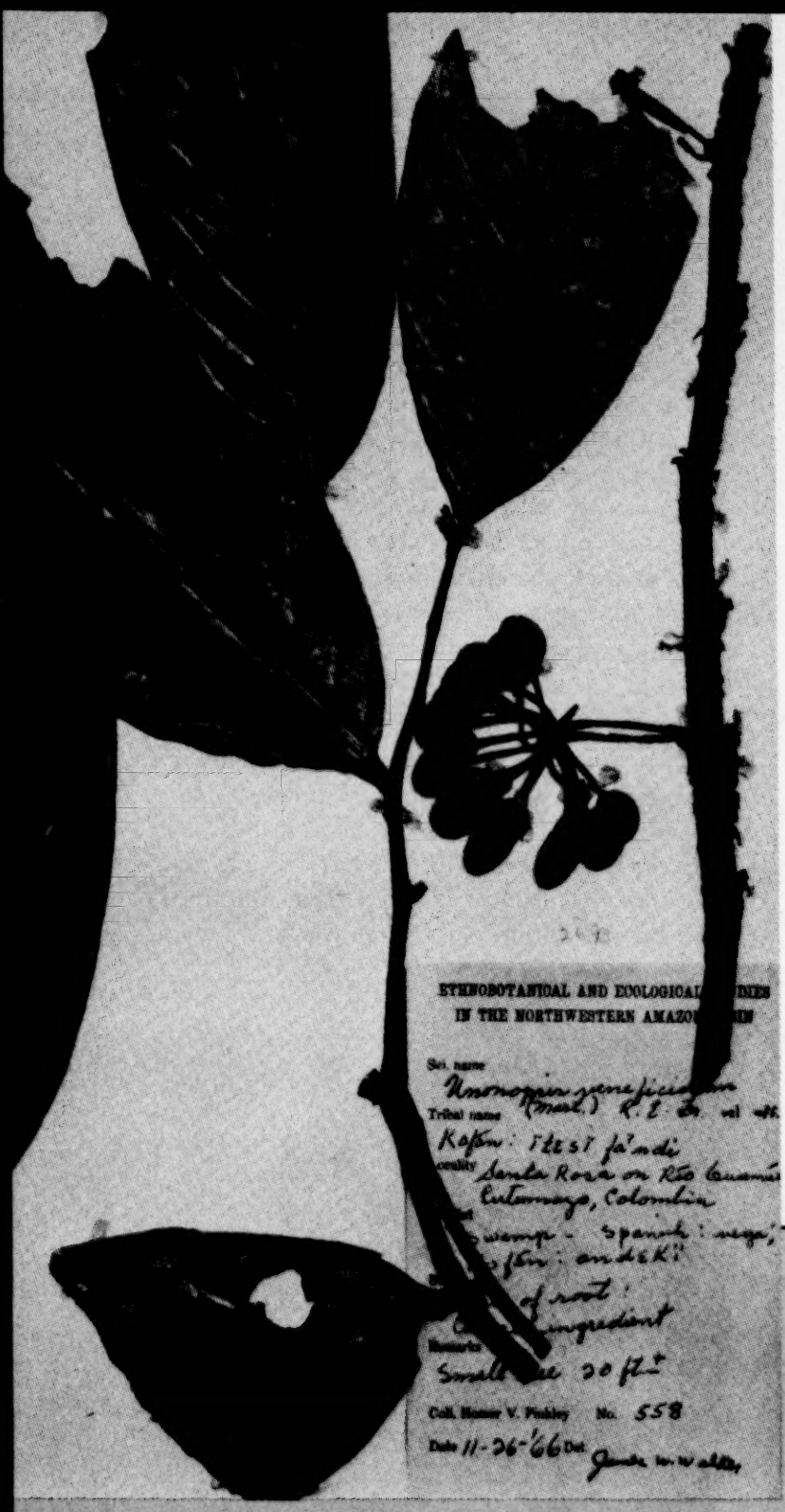
—Howard Rheingold

Selected Species for Priority Collecting

These excerpts from more detailed descriptions are a small sample of files we are keeping on many needed species. The levels of effort, expertise, paperwork, and luck required to successfully acquire a viable specimen vary from plant to plant. The search may be as simple as seed-hunting in native markets and local botanical gardens, or it may involve wilderness trekking. Note that while all of the plants on this list are threatened to varying degrees, none of them are on official endangered lists — we leave those species only to highly experienced plant collectors.

Chlorophora tinctoria "Incira." The sap of this tree is used as a painless tooth extractor by Amazonian tribes. The preparation is swabbed into a decayed tooth, killing the pain; within days, the tooth breaks into pieces and is removed easily. Could be grown in tropical countries for rural community dental clinic use. Native to Upper Amazon forests and along the Pacific coast of Panama.

Metroxylon solomonense "Solomon Islands Ivory-nut Palm." Roofs thatched with this rare endemic species last over 20 years in rainforest conditions, while most other known thatch plant materials must be replaced within 3-6 years. Very fast-growing in its habitat, producing 30-foot fronds within its first few months from seed. Durable shelter could be produced readily in humid trop-



Typical herbarium sheet sent to a specialist for identification.

botanical gardens), where collected plants are being nurtured in tropical or semitropical gardens and propagated against the day when their pharmaceutical and medicinal properties can be studied properly. And a small network of collectors is helping to ensure the survival of plants native to Asia, Africa, Central and South America. But these small networks will not be able to rescue more than a fraction of the potentially useful plants.

This is where ordinary people — gardeners, travelers, people looking for something to do about the deterioration of the natural world — can provide enormous leverage. Some people have knowledge and information. Others have, or plan to have, proximity to the plants. Yet others know how to export plants, and how to get them to one of the landarks. With the right kind of coordination, the right knowledge, the right spirit, and a small amount of money, we might be able to act together and grow an effective international effort very quickly.

Many people don't enjoy the idea of being "tourists." They want to respect and contact some authentic experience of the forest or jungle environments, and learn something about the cultures of the lands they visit. With a short period of training in the identification of endangered useful plants along the path of their itinerary, the right reference materials, a good illustrated guidebook, and a list of local contacts, a traveler can become an explorer and a

ical communities from modest neighborhood groves of this rare relative of the true Ivory Nut palm. Sprouted seeds are easily collected from houseyard trees on Guadalcanal, since the tree dies after finally fruiting.

Tabernaemontana spp. Pharmacologists are investigating all *Tabernaemontana* species of shrub with intense interest since the discovery of astonishing yields of dozens of previously unknown alkaloids with importance as potential treatments for leukemia, tumors, heart disease, multiple sclerosis, and as a non-anaesthetic cerebral stimulant.

Gomortega keule. An extremely rare psychedelic fruit tree, an endemic restricted to a single locale only a few miles across in the vanishing Valdivian forests of Central Chile. This exotic psychoactive has no close botanical relatives, being a single species of the only genus in its own separate family. Aromatic intoxicant of the Mapuche tribe, Keule fruit has never been analyzed or cultivated. Thorough searching may reveal other locations or specimens in Chilean botanical collections. Seeds are most abundant March through June. The plant could be grown in temperate areas.

Maytenus laevus "Chuchuhuasa." This is a popular herbal remedy in the northwestern Amazon of Colombia, Ecuador, and Peru. Italian researchers have found the easily soluble chemicals of this tree's rootbark to be promising treatments for skin cancer and arthritis and as a prophylactic against radiation damage. Collectors will find bark and tinctures readily available from market herbalists, and should attempt to get viable seeds from regional varieties for future comparison.

Palicourea brachyloba "Ahuara Macha." Recently discovered use of this rare Bolivian rainforest tree demonstrates its effectiveness as a toothache remedy. Chacobo natives of the Upper Amazon forest region in Bolivia's Beni lowlands collect the leaves fresh, which are chewed to numb the nerves of the infected teeth. This species is uncommon in its habitat, and the entire region is threatened by imminent deforestation. Collecting live material for propagation and study is an urgent priority, given its scarcity and uncertain future.

contributor to the effort to save the most important parts of our dying botanical heritage. In the case of seeds, travelers can mail specimens internationally to those of us who can shepherd them through the agricultural inspection and customs procedures. Others, more expert in the process, can help us trans-ship living specimens to their ultimate destinations in botanical gardens and greenhouses.

The core network that already exists is nurturing a small portion of the tens of thousands of specimens that could be saved if we act quickly. We welcome the participation of experienced botanists, and we also need amateurs who are willing to be trained in plant identification, as well as ethnobotanists who can help us train this Gaian expeditionary force. We need people who own or can use land in tropical or semitropical climates or greenhouses in temperate climates. We need people who are willing to perform data entry, conduct library or database research, photocopy documents and references, lay out and print written training material, stuff envelopes, propagate seeds. And we need to know how to communicate with one another. In that regard, the Botanical Peace Corps is primarily a communications web that gives power to the whole group by putting individuals together with each other and with the right information.

The Botanical Peace Corps is a self-organizing system. There is no top or bottom, employer or employee, just a network of people and institutions dedicated to preserving at least a fraction of the precious plant knowledge. We need to act quickly, globally, in an informed and coordinated manner. A citizen-amateur-expert network has the potential for spreading very quickly, for it is a direct answer to the billions of citizens who are concerned by what is happening to the natural world but feel powerless when it comes to doing something about it.

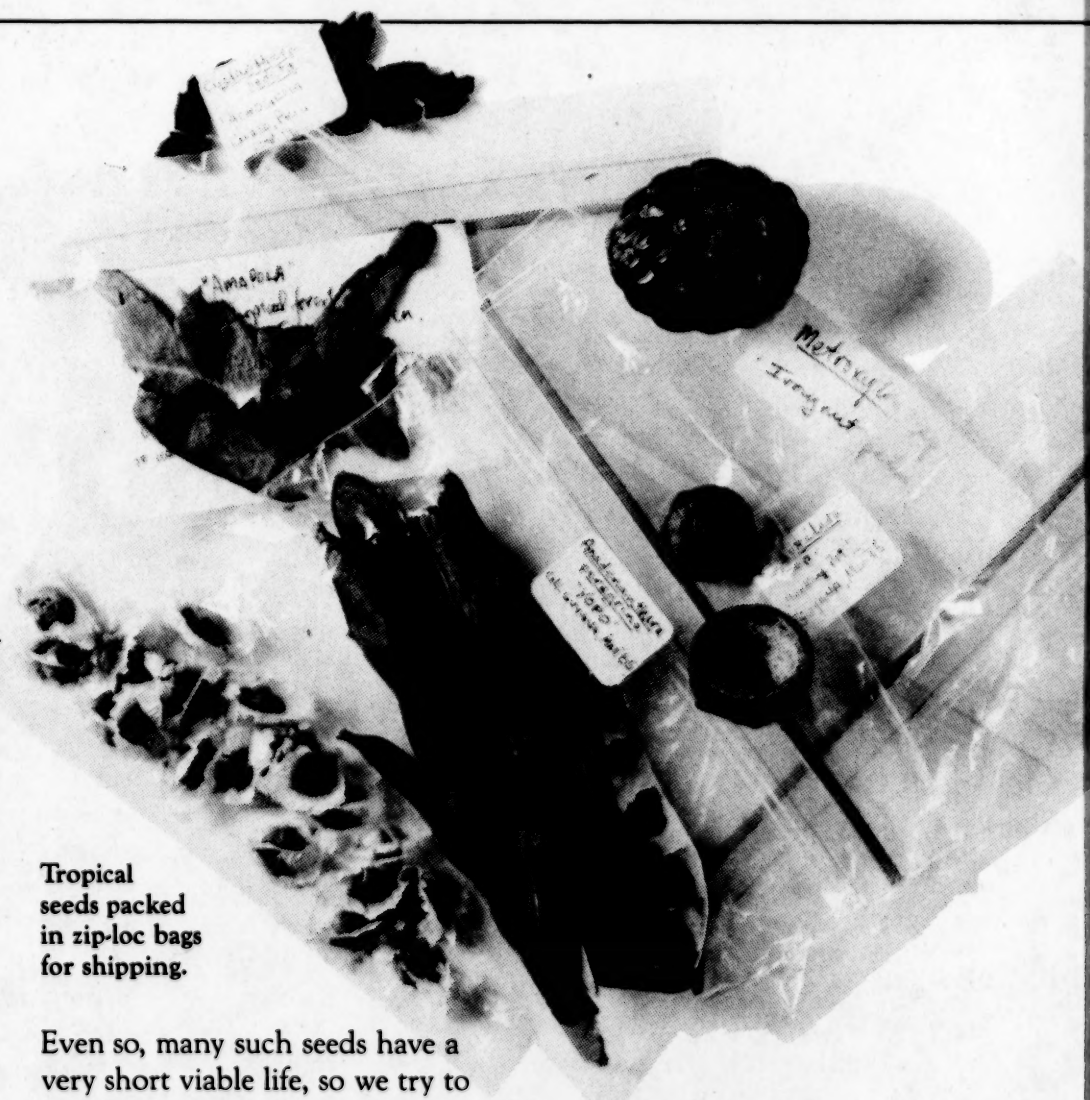
Ordinary people who want to make a difference are the core of the network, along with university ethnobotanists, formal and informal botanical gardens, and trainers who can educate amateurs. People need to know that they can make a difference. They need to know how to obtain proper training, and how

Field Guide For Collectors

Travelers or those who live in areas where desired plants can be found will receive a field guide to help them guide their effort. For maximum effectiveness, the field guide will be used as the written curriculum for hands-on training sessions. The table of contents for the field guide follows an excerpt from one of the case histories from the full text:

• Gather pulpy or fleshy fruits when very ripe, preferably groundfalls which are slightly fermented but not yet decomposing. Larger fruits can be mashed in a bucket of water, left to ferment a couple days, then rubbed well to separate the good seeds, which sink. Hard-fleshed berries are trickier. We managed to easily de-pulp a large batch of Heliconia once in Ecuador by rotting the small, freshly-picked fruits in a sealed plastic bag. Several days later, the slimy pulp was rubbed off by transferring them into a burlap sack and treading it underfoot on a flat rock along a stream.

• Many tropical seeds perish upon drying, and care must be taken to preserve a degree of moisture after cleaning and treating them.



Tropical seeds packed in zip-loc bags for shipping.

Even so, many such seeds have a very short viable life, so we try to use the time spent in transit to maintain maximum viability and in some cases to even germinate during shipping.

Surface dry the seeds in shade 4-6 hours. Place them in a plastic bag with fine holes. Soak some peat moss or fine charcoal in 1% sodium hypochlorite solution (household bleach is 3-4%). I carry compressed jiffy pots, and one is enough for most of the day's work. Squeeze the moss as dry as possible. Let it or the charcoal surface dry for 4-6 hours as well — do this simultaneously

to pass their finds along to other members of the rescue network.

We have a "wish list" of plants that are needed for various reasons. And we have detailed information about each plant for those who are traveling to countries where it can be obtained. The first training sessions will be underway soon. Dedicated travelers, botanists, anthropologists, ecologists will learn how to help locate seeds and specimens that have already been identified, how to prepare and ship them, and how to collect indigenous folk medicines for identification. When they are trained, they will be connected to the existing network, and when they return, they will help us train others.

If you are interested in participating, send a letter to Botanical Peace Corps, P. O. Box 1368, Sebastopol, CA 95473, and enclose a self-addressed, stamped, return envelope. You will receive a questionnaire regarding the travels, resources, skills, time, knowledge you would like to contribute. If you think you can help us obtain one of the plants (or seeds) on the portion of our wish list published here, let us know which plant interests you and we will send specific information. The wish list published here is a small sample of the many plants on our longer list.

We are committed to a responsible approach to the natural environment, so some of our training material concentrates on low-impact collecting strategies. Some of the written material we provide, and stress in our training, is cultural information that relates to our collectors' effects on the social environment — advice on unobtrusive ways to behave in developing countries, especially in regions where indigenous cultures still exist. Sensitivity to the impact of our activities is a top priority. In this regard, a knowledge of proper conduct is more important than botanical expertise.

Ethnobotany is traditionally a field in which amateurs have made significant contributions. We have a small window for action. Let's take the opportunity. Many people, each doing a small part, can accomplish great deeds. Our grandchildren will thank us for it. ■

when treating the seeds. Place a small amount in each bag (1 tsp. per 30-50 seeds). This should hold them in good condition for 2-4 weeks. If a long time before planting — check occasionally to make sure the seeds are not too moist.

Earlier this year, I sent two shipments of a fruiting palm seed (*Zallaca zallaca*, salak) to friends in Brasil. Salak has a notorious viability: reported as 50% at 3 days, 0% at one week. The first shipment arrived in 20 days with 100% germination, the second 4 weeks later for a total of 56 days with only one seed not germinating (95%). The salak seeds were treated and packed as described above. (Alan Carle of Mossman, Australia)

• Tiny seeds may be mailed in airmail letters. Small seeds should be placed into a series of small packets taped evenly on stiff paper and wrapped with enough padding to prevent crushing but still feel like a regular letter. One professional botanist mails seeds and even seedlings and cuttings perfectly packaged to seem like academic printed matter. Separate mailings like these back up the regular imported stock to ensure some specimens make it.

Table of contents from Botanical Peace Corps' Field Guide

Target Priorities: Species, Categories, Regions, and Folklore
- Particular plants
- Plant Categories
- Threatened Species:
  - Precautions and procedures
- Introducing Weeds:
  - Precautions and procedures
- Ethnobotanical Data

Techniques for Seed Collecting, Cleaning, and Shipping
- Collecting
- Cleaning
- Drying
- Treating
- Labelling
- Packaging
- Shipping

Techniques for Collecting Plants and Non-Seed Propagative Parts
- Seedlings
- Cuttings
- Divisions
- Rhizomes and Bulbs
- Treatment
- Labelling
- Shipping

Collecting Non-Propagative Material, Herbs, Research Specimens
- Dried vouchers
- Plant products
- Artifacts

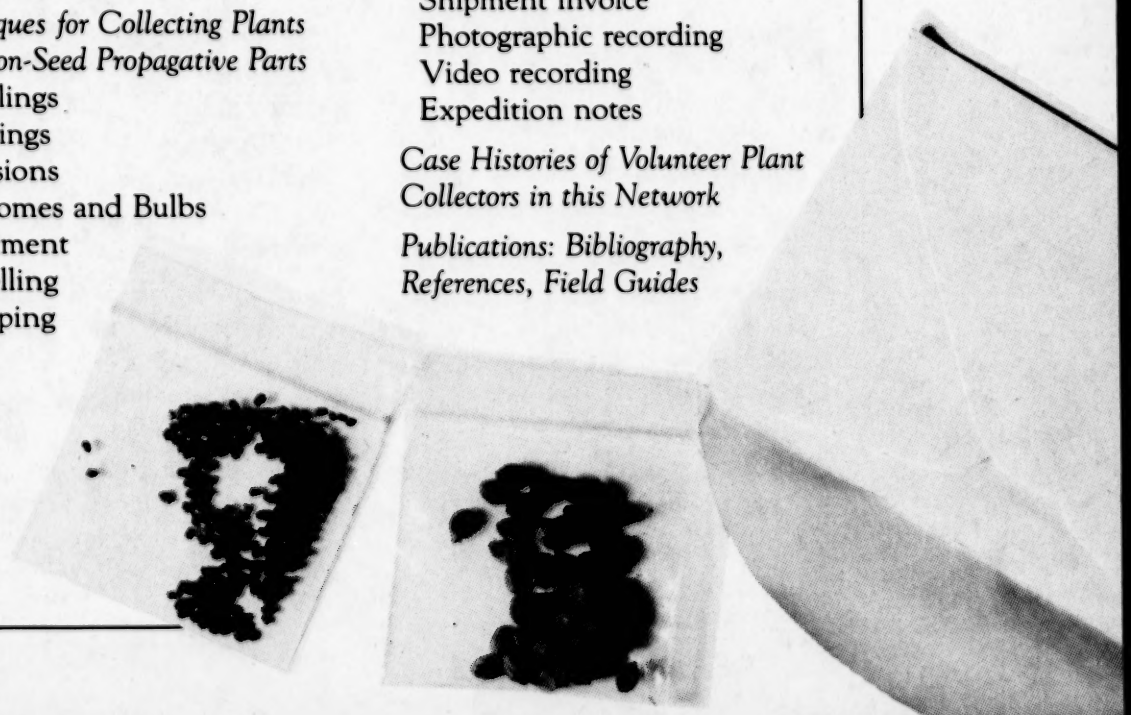
List of Useful Tools for Collecting Seeds, Plant, and Data in the Field

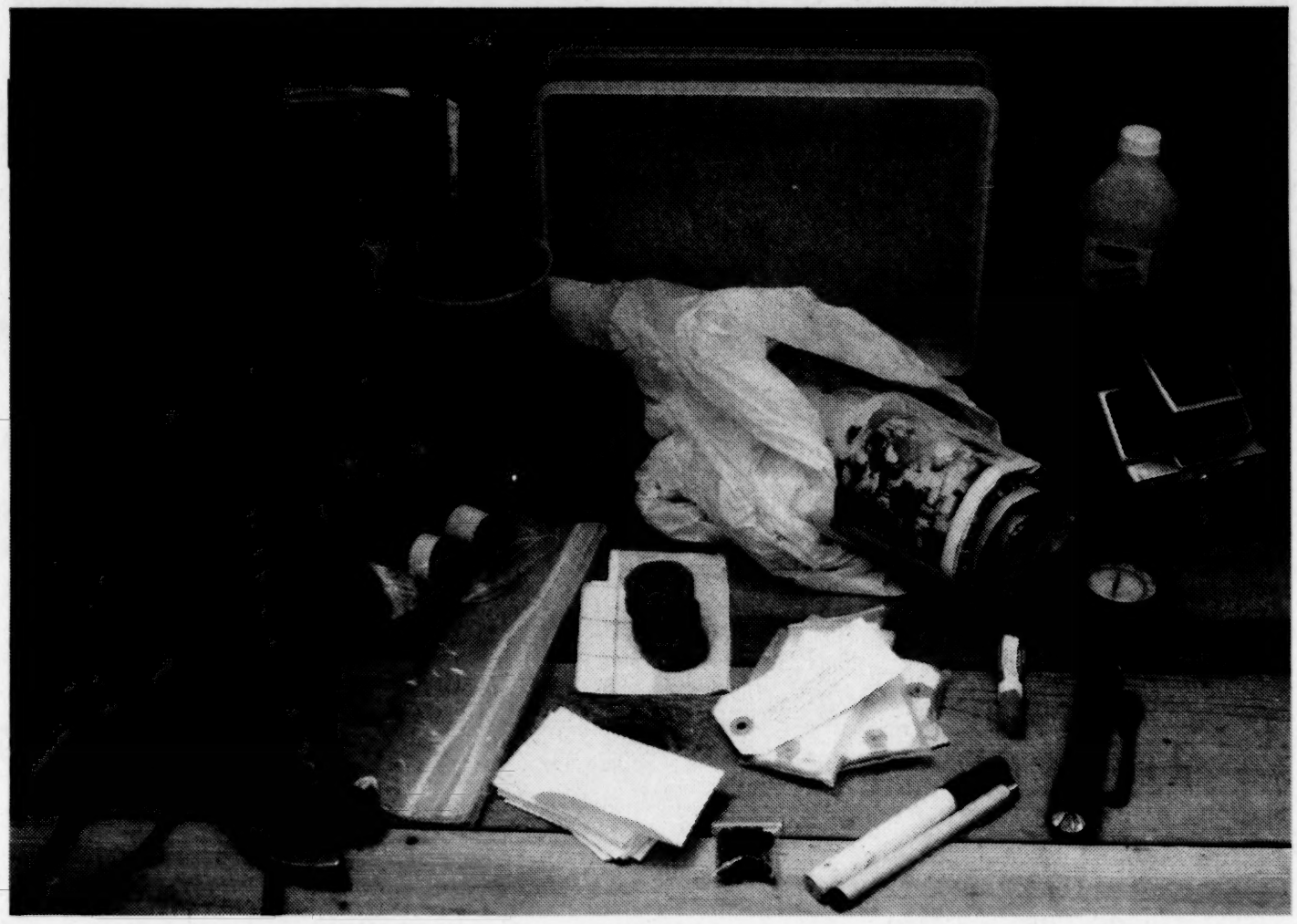
Permits Required for Collecting, Exporting, and Importing Material

Systematic Data Collection and Recording Methods
- Botanical data
- Ethnobotanical data
- Environmental data
- Local contacts
- Maps
- Tape recording
- Shipment invoice
- Photographic recording
- Video recording
- Expedition notes

Case Histories of Volunteer Plant Collectors in this Network

Publications: Bibliography, References, Field Guides





Kevin Kelly

Ethnobotanical Research Field Kit

BY ROB MONTGOMERY

Here's what to get:

Tupperware-type containers. Will keep anything dry. Deep sandwich-sized ones are great. A shoebox-sized container can hold 8" x 11" paper and most of the things shown above. These snap-lid containers are rare, practical and much-appreciated gifts to bestow upon helpers and hosts in humid tropics. From variety stores, 5" x 6" x 16" size $5.

Strapping tape. The kind with reinforcing fibers in it. Very useful (and very hard to find outback) for parcel shipments, mending, and as a rope substitute when rolled sideways into a "string." From hardware stores, $3.70.

Superglue. Not only wonderful for quick mends of equipment, cyanoacrylate glues are also excellent for emergency microsurgery. Sounds weird, but superglue will close up surface-dry wounds in spots nothing else can — like hair coated injuries. Just squirt the glue in the wound liberally. It works like stitches, and is similar to products now used in hospitals. Just the thing to use on tropical botfly stings (not uncommon; they lay disgusting larvae beneath the skin). Seal up their airhole with superglue. From variety stores, $2.

Seed containers. Plastic film canisters are ideal, and often free. Paper envelopes for coin collectors work great too. Wedding-invitation envelopes work in a pinch. From stationery stores, coin envelopes $1/400.

Ziploc-type bags. Bring dozens of these; they're hard to find outback. Sandwich- and gallon-size are the most useful. From grocery stores, gallon bags $2/20.

Moss. To ship live plants back, you need to wrap their bare roots with moisturizing and sterile moss — not soil. Using wild native moss is prohibited. Peat moss is elegantly convenient to carry in the form of Jiffy Pellets, those little disks that swell with water. One of these moistened with 1 percent bleach will coat many batches of perishable seeds needing humidity in transit. Just toss into Ziploc bags. Sphagnum moss can be compacted easily for storage, and unpacked and moistened to wrap roots and other propagative parts. From garden stores, Jiffy Pellets $2.50/25, Sphagnum moss $2/2 quarts.

Superthrive. This is a brand-name product made of liquid B-vitamins; it is real magic in reducing plant trauma and enhancing seed viability. A tincture diluted 50 drops per cup should be misted on entire plant, seeds, and any material in direct contact with them. From garden stores, $4.50/4 oz.

Notebooks. The idea here is to assign an accession number for every specimen, and then enter whatever data you compile for that specimen into a notebook — locality, date, description, photo, etc. — under that number. That number follows both the specimen and the data, whether or not the plant or seed is identified. Often, identification isn't determined

by a professional until later on. Use convenient pocket-size notebooks on site and then transfer the data to a larger hardbound book while the notes are fresh. From stationery stores, journal $5, booklet $.50.

Labels. You need several sizes of adhesive office labels and strong manila tags with reinforced holes for plant and seed labels. From stationery stores, 1″ x 3″ labels $1.70, tags $6.70/100.

Waterproof pens. They need to be really waterproof. Try spilling coffee or dripping forehead sweat on a test label or page before using on a trip. Also test to see if alcohol dissolves it. From department or stationery stores, "Sharpie finepoint" $.97, "Stanford Rub-a-Dub" laundry marker $.99.

Plant press. The classical, cumbersome wooden one is for the truly devoted. A very useable makeshift press can be whipped up using universally available newspapers. Fresh plants are inserted between doubled newspaper pages, along with their accession number written right on the paper, and then rolled up tightly like a carpet. Additional specimens are added and the roll gets larger. Store in a leakproof plastic bag and keep moist with alcohol. Later, unroll and dry the materials using a herbarium press as soon as possible.

An herb specimen is laid between pages of a local newspaper. Large specimens like this leaf can be folded to fit. The sample is rolled while green, and kept moist with alcohol until it can be pressed and dried flat.

Try borrowing one from the nearest Botany Department; always donate duplicate specimens to them for the loan. From Carolina Biological Supply, wooden plant press $30.

Machete. With sheath and file. Shortest blade length is more portable. Bring along 3/4″ triangular file for sharpening. From hardware or camping stores, $20, file $5.

Serrated knife. Alternative to large machete. Indispensable for cutting, sawing, chopping, and even digging. Best kind is the special curved Japanese gardener's 6″ sickle, but any strong, broad serrated knife will work. From garden and hardware stores, $2-$10, Rogers 5¼″ stainless utility knife, $3.

Fungicide. For seed shipments. Should be rated low in toxicity (on label) and be a dazzling color to impress quarantine inspectors. Copper sulphate or sulphur products are suitable. Common bleach is fine, too. Dilute Clorox in 3 parts water, dip seeds for 15 minutes, dry and toss into moss. Or use sodium hypochlorite tablets, which can also purify drinking water. From camping stores, tablets $3/20, and from garden stores, "Microcrop" (90-percent copper sulphate) $4.50/8 oz.

Alcohol. For pickling specimens, formaldehyde works best, but it is very toxic. Use alcohol to help preserve plants before full drying. It is hard to imagine collecting plants somewhere that 70-percent distilled booze or moonshine cannot be found. Or you can use rubbing alcohol, from pharmacies $2/quart.

Strainer. Helpful to de-pulp seeds. Best for ease of hauling is an unbreakable 6″ plastic sandbox toy ($1), or a 3″ tea strainer ($2) with handle cut off.

Flashlight. Best type is waterproof MiniMag brand. Take extra batteries and bulb, which are hard to find. From camping stores, $13.

Personal gear. Never, ever take camouflage or army-surplus style clothing and gear such as a camouflaged compass or mess kit. You will be suspicious-looking enough and little details can be damning.

Trade items. Consider low-impact non-disposables which are hard to get — batteries, plastic containers, etc. Stainless-steel fishhooks are easy to carry and very much appreciated. Officials must be dealt with at every level from jungle checkpoints to immigration to traffic cops. The diplomatic exchange of the right gift can smooth small requests such as guarding extra gear, visa extension, or overlooking an infraction, but only if you're at ease with the procedure. Embossed-name, hometown police uniform buttons are good — promise the local official you'll bring back theirs in trade.

Optional Equipment

Instant camera. Lets you see your shot and be sure it's good. Plant collectors' features: close-up ability, time-release shutter for low-light forests. Brings lots of film and flashbulbs. From camera stores, Polaroid SX-70 $90.

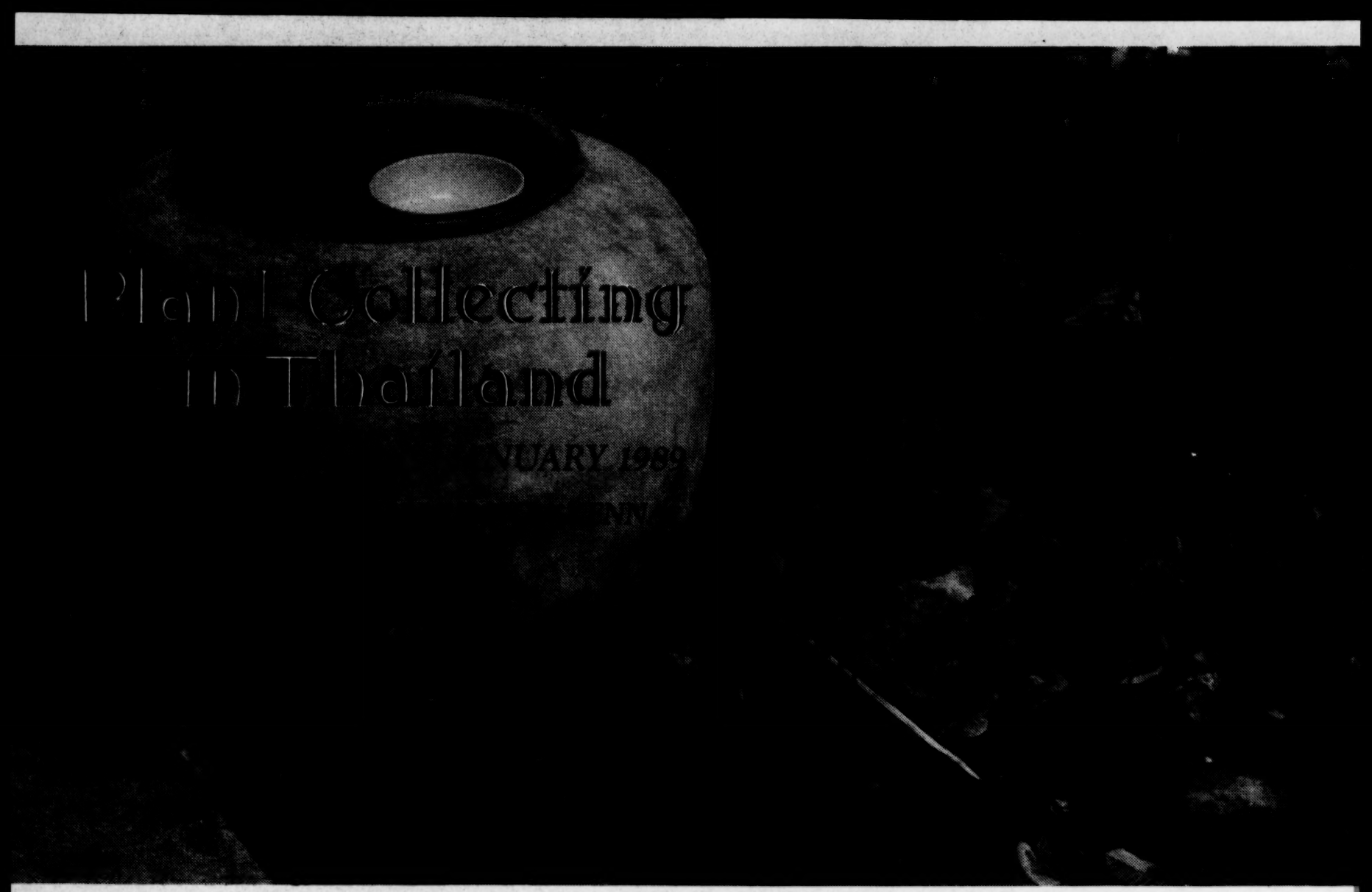
Map pipe. Precut a 3″-diameter ABS plastic pipe to fit a standard rolled-up map, and fit with a removable cap at each end. It'll keep all your maps undamaged. From hardware stores, about $11.

Altimeter. Useful when searching for plants with known elevation range. A pocket altimeter (0-4500m range, 50m increments), from good backpacking stores, $13.

Hand lens. A Bausch & Lomb folding pocket lens with 20-power magnification is very rewarding, and works wonders on virtually everything — fifteen minutes of marveling on one single, tiny vista will transmit semesters of esoteric wisdom. From stationery or nature stores, $15.

Tape recorder. Try recording essential field data in a rainforest (remember why they call it that) and you can appreciate the luxury of voice-activated, pocket-size, microcassette recorders. Just speak in your collection number and every detail you wish. Transcribe later. From electronic stores, voice-activated Micro-Corder $250-ish. ■

Plant Collecting in Thailand



BANGKOK: The worst traffic congestion, air and noise pollution, and homely third-world "prosperity" architecture imaginable, yet with jewel-like temples tucked in the cracks, water buffalo in the alleyways, and barefoot saffron-robed monks withdrawing money from automatic teller machines. A vast working class still working as the future has risen around them and strangled their so recently exquisite aesthetic. Addiction abounds: the Marlboro Man rides a billboard above a golden Buddha. The traditional opium habit has degenerated into heroin, PCP, methedrine and acute alcoholism. To go outside one's hotel is to take a breath and dive in. To cross a boulevard is to risk one's life. To get from here to there and back again is a daily Asian odyssey. Soon one tires of observing contrasts, wishes the reason to be there would finish, simply wants to escape to the islands or the mountains, or to another reality.

I had heard about "kratom" for some months: A tree, *Mitragyna speciosa*, native to Thailand and Malaysia, the leaves of which have been used as an opium substitute by some when the poppy supply is low, but also well known as a folk cure for opiate addiction. It apparently minimizes the nightmarish symptoms of withdrawal, making a phased self-imposed release of addiction possible. In addition, the rural working people — rice farmers, truck gardeners, fruit pickers — use it to diminish hunger, to extend physical energy for labor, to reduce the effects of extreme heat. Much as the raw coca leaf is employed in South America by those native people who have no use for a refined product, kratom has remained a folk medicine, with strengthening and healing properties, as well as the now-ubiquitous abuse potential.

Two New Zealand researchers (Jansen and Prast, 1988*) who are hard at work on *M. speciosa* feel that it has great promise as a non-debilitating addiction treatment, better than methadone. The plant, containing twenty-two alkaloids, seems to be more effective and benign than the extracted dominant alkaloid, mitragynine. While publishing their studies, they have issued a call for more attention to this plant, yet there are very few, if any, trees outside Southeast Asia. In fact, *M. speciosa* has been illegal to possess in Thailand for some years, but is still widely grown in garden compounds or amidst banana or mango groves by the many who value it. We decided it would be worth trying to

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Kathleen Harrison McKenna is the president of Botanical Dimensions, and editor of its newsletter, Plant Wise. *The idea of using botanical medicines to treat drug abuse is one of many potentially valuable ideas that are emerging from a closer look at traditional uses of plants.* Plant Wise *carries updates of the organization's current steps to conserve medicinal and magical plants, cameos of exotic folk-medicinal plants and their traditional and current uses, news on the worldwide ethnobotanical front, and articles about the history and future of the relationship between plants and people. Requests for a sample issue and subscription information, and tax-deductible contributions, may be sent to Botanical Dimensions, P. O. Box 807, Occidental, CA 95465* —*Howard Rheingold*

(Left) Medicinal herbs being propagated, Thailand.

(Right) Kat McKenna interviewing Buddhist monk, Tham Krabok Wat, Thailand.

Kat McKenna

Nina Wise

collect and establish some saplings. Soon after that, a traveler was able to send back seeds, but they proved very difficult to germinate. When an opportunity arose to spend two weeks in Bangkok in January of this year, I decided to make it my mission to find the plant and investigate its use. Knowing that the plant was found in the vicinity of Bangkok, it was the first time I'd searched for a plant in a metropolis, and I had to be careful how and whom I asked; I was somewhat intimidated, but challenged.

I rendezvoused with an old traveling friend there, and together she and I researched possibilities and negotiated taxi fares. Knowing that a good place to look is often in the usual Royal Botanical Garden, I was perplexed that nothing of the sort existed in the entire city. I finally deduced that since Thailand had never been colonized by Europeans, no such artifact of colonization was left there. We found a medicinal plant information center, and through them a very fine professor of pharmacology. Walking into his classroom, we saw long rows of uniformed university students, each bent over his or her microscope, making notes. When I asked what they were doing, the professor told me that they were analyzing medicinal plant compounds, of course. I only wished such a sight were common in the States. It turned out that he, with the help of his department, had started a small ethnobotanical garden some distance outside the city, and a few days later he graciously toured me through it and we agreed to trade species. He was very excited to think he might obtain some South American species without having to go there, which of course was outside his modest budget. On the other hand, his garden is maintained by a staff of fourteen for the same amount it costs our project for a staff of two, and is as manicured as a golf course.

I tried several approaches in my search: Combing the weekend plant market, a bazaar which displays edible and ornamental rooted specimens brought in from the countryside, along with hilltribe crafts and racks of used men's dress shirts from California (very popular with the teenage girls). I found an unusual roseapple there, medicinal tamarinds, and betel-nut chewers, but it was becoming clear to me that *M. speciosa* was just underground enough to be elusive. Next, we spent a day outside the city, at a Buddhist monastery that specializes in treating drug addiction (CQ #33, p. 76). Addicts — mostly young urban men — come willingly to the program, which consists of powerful plant purges, herbal steambaths and dharma teachings. The monks would not reveal what plants were used in the purge, but it was made clear kratom was not among them.

On my own again, beginning to feel frustrated, and not yet having found the perfect taxidriver to trust my request and myself with, I fortuitously bumped into an American friend who had sampled the leaves previously. He was willing to track down a sapling, and knew a guide he felt could lead him to it. They traced a rumor to a road into a rice paddy, to a country herbalist who found for them a strong rooted cutting and many seed pods. I used the hotel shower to cleanse the plant and several other species I had collected of all soil, carefully packed the roots in damp shredded newsprint and plastic bags, boxed them, included permits, and sent the package on its way. Small amounts of money crossed palms at every juncture. The fact that a now-devoted taxidriver was able to arrange international express service showed me that Thailand is indeed on the verge of the 21st century, come what may. Several days later the plants arrived in Hawaii (the home of our nursery) in fair shape, considering the journey they had undergone, and are now being nursed in a tropical shadehouse. There, germination and propagation efforts will continue, researchers will be notified, and plant material will be made available for study. Mission accomplished, botanical contacts initiated, I left Bangkok and entered my holiday. ■

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* Jansen, Karl L.R., and Prast, Colin J., "Ethnopharmacology of Kratom and the Mitragyna Alkaloids," *Journal of Ethnopharmacology*, 1988, issue 23, pp. 115-119.

Jansen and Prast, "Psychoactive Properties of Mitragynine (Kratom)," *Journal of Psychoactive Drugs*, 1988, Vol. 20 (4), pp. 455-457.

DELICIOUS SACRAMENT

The Power of Plants

CORN AS A SPIRITUAL COMPANION

BY HOWARD RHEINGOLD

A PLANT CAN BE A TEACHER, a companion, a food, and a sacrament. You don't have to accept this testimonial on faith and you don't even have to search the Amazon for exotic psychobotanicals in order to see for yourself. A handful of corn seed, a sunny garden, some water, and your regular attention are all you need. It is possible to combine these ingredients at the right time, with a modicum of mindfulness, and magically invoke the presence of a tasty spiritual being. Growing corn and eating it is a direct experience of Gaia at her yummiest. It cuts right across the abstractions and plugs you directly into the planet.

I didn't know it when I first started playing with corn, but when curiosity led me to the scientific literature I discovered that the matter of corn's origin is far from settled. One prominent theory contends that modern corn was domesticated in Mexico around six thousand years ago. This hypothesis, previously unknown to me, helped make sense of the mysterious power I felt emanating from the plant. Like an archaeologist who unseals a tomb that was ritualistically sealed thousands of years ago by a different kind of specialist, I can commune with my corn and feel a bond with the people who cross-bred wild pod corn with a perennial form of the wild grass *teosinte*. Every kernel of seed corn embodies a covenant between human and plant. My garden connects me across space and time to spiritual technologists whose names are lost to history but whose deliberate miracle resonates in every corn patch in the world.

I entertained the fantasy of growing my own corn ever since I heard that corn passes its zenith of sweetness if you wait more than a few minutes to cook it after you pick it. When we moved to a piece of ground with a large garden, I learned that corn can be eaten raw for breakfast — blissfully, standing barefoot among the plants on an August morning. But my relationship with my first crop grew beyond simple, glorious, chin-dripping sensuality. I hadn't reckoned with the

awesome personality of the plant that revealed itself as I watched it perform its green alchemy.

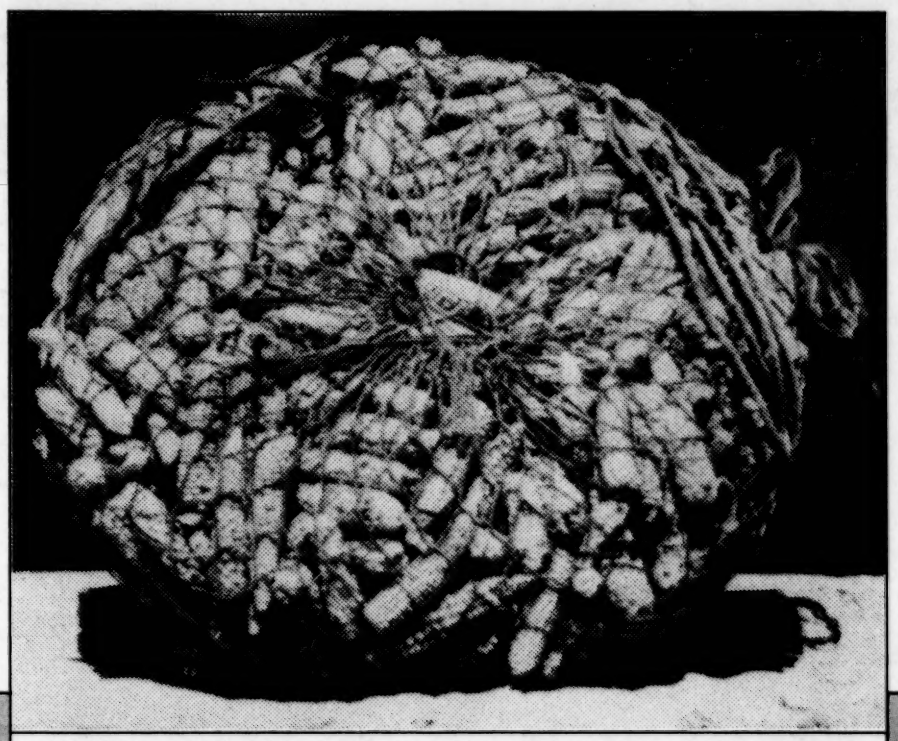
Corn seed is shriveled and rock-hard. But you put it in the ground and water it and about ten days later, a seedling pokes up. Come back in six or seven weeks, and you are looking up at a 12-foot-high plant. I remember the day my first crop reached eye level. I was working in my home office, taking breaks to visit the garden. As the day progressed, each time I passed between the two corn beds, I began to notice that all the corn plants were leaning toward the sun. Not a surprising revelation, but when you notice it often enough to catch a visceral sense of the slow but precise movement, you realize that the whole field of corn swivels like a computer-controlled antenna array or a crowd of people at a sporting event. Corn is rooted to its spot, but commands a heliotropic cone of movement high into the air. I was shocked to recognize this degree of sentience in a life form I had previously misperceived as a "lower organism."

Part of the spiritual dimension of corn is its system-ness. The annual cycle carries it forward through time, and it goes back into the past to someone about 6,000 years ago, somewhere north of Chiapas and south of Mexico City. There is the spatial-unfoldment system, from shriveled little pebble to majestic swaying stalk twice my height in a couple months. There are the companion plants interconnecting the corn, the earth, the atmosphere, into an awesomely efficient solar energy system. The roots and symbionts and worms. The number of sunny days. Each time I touch each plant. Each word I say to them. The thoughts I have out there in the corn patch.

When the Pilgrims had that first Thanksgiving, part of the bounty of their harvest was due to the generosity of their indigenous friend, Squanto, who told them to bury a dead fish under each corn plant. Little did he suspect that these guests were also sowing the seeds of his people's destruction. My present corn bed is on the site of an old Miwok shell mound. I found a serpentine arrowhead out there while preparing my second crop. It's hard not to be mindful digging in this corn bed after that. It's hard not to remember that all our corn beds are built on the graves of murdered civilizations.

Traditional forms of the corn religion are far from extinct. I had known since I was a kid growing up in Arizona that the Hopi revere and celebrate corn. When I finally saw a Hopi corn plot I was struck by how improbable it was. It's amazing that anything grows in the Arizona heat, and the Hopi mesas are in beautiful but arid country. You have to know what you're doing. Instructions for planting corn and companion plants are built into the Hopi religious ceremonial cycle. The ceremonial cycle helps remind them to plant beans when the corn is at a precise height. The beans climb up the stalk and fix nitrogen in the soil for the corn. Then squash leaves shade the ground and conserve moisture, creating a microclimate for the compact corn-bean-squash desert life-support system.

Corn is a living cultural artifact, an astonishing colony of bioenergy systems, a nourishing message from the past, a sacred symbol, a summer meal, and a reminder of the possibilities in-



Indian Corn in Old America

The pre-Columbian practice of bundling corn to haul it after harvest is still practiced in the highlands of Guatemala.

INVENTING CORN

There has always been a central mystery about corn: where and when did it arise, and — most important — from what? Corn as we know it is a thoroughly domesticated plant. It is the most efficient of all grasses at producing grain, but it is unable to survive without human help because it has no way of spreading its seed. The kernels on an ear of corn cling tightly to the rigid cob, and if the ear were simply allowed to drop to the ground, so many competing seedlings would emerge that in all likelihood none would grow to maturity. The ear in its hundreds of modern varieties was created by human beings for human purposes through centuries of selective breeding; it has no counterpart anywhere in the wild, or for that matter among other cultivated plants.

. . . It was Columbus who discovered corn in Cuba and brought it back to Spain. Within a generation it had spread throughout Europe; within two generations it was being grown around the world in every region suitable for its cultivation. Only two other New World products, tobacco and syphilis, spread with equal rapidity.

By the time Columbus encountered corn, Indians were growing it from Canada to Chile. Corn was the basis of all the advanced pre-Columbian cultures, including those of the Incas of South America and the Maya and Aztecs of Central America and Mexico, but it was first domesticated well before those civilizations flourished.

—From "The Origin of Corn" by Paul C. Mangelsdorf, *Scientific American*, August 1986.

herent in human-plant cooperation. Anyone can count the kernels in an ear of corn, but nobody can count the ears of corn in a kernel: the delicious sacrament that travels through time. □

Howard Rheingold submerges himself in his midsummer corn plot.

Kevin Kelly

HOW TO GROW CORN

Since not all Hopi know the traditional ways of growing things, especially younger Hopi, it is now up to the elders to teach them some wisdom in growing corn and other crops. Herein is a brief view.

The elders would say that growing things is important and sacred. It holds the significance of many things, that without food there would be no life. Someone must provide food so that all life will continue on with good health and happiness. One must be willing and put his heart into it. That way, one will gradually blend with the field so that he will work in harmony. When planting one must be in a good humor, no anger or sad thoughts. One must sing and talk to the seeds, encourage them to come to the surface with joy. When they surface thank them and encourage them to keep strong. As they grow you walk among them to talk and sing to them. Pamper them like children. At harvest time you thank them and also the unseen spirits who helped them make it possible for the harvest which will provide food. These are a few sides of the wisdom of growing crops.
—*Techqua Ikachi* #29

Techqua Ikachi, "land and life," is published in the traditional village of Hotevilla in the Hopi Independent Nation. It represents the viewpoint of the village leaders, including David Monongye, Jack Pongyayesva, Paul Sewemanewa, Dan Evehenma, Amos Howesa, and Lewis Naha. Information from Box 174, Hotevilla, AZ 86030.

Out-of-print, but not out-of-date, plant books

by Greg Williams

Vast fields of unexplored knowledge are buried in the green cells of plants. A tiny fraction of that secret knowledge has been deciphered over thousands of years of human interaction. This small shred of plant science is nonetheless vast for an individual seeking it, and still buried, too, but in the tombs of libraries. Some of the best knowledge about plants is found in old, out-of-print books. Since plants haven't changed much, these books are remarkably pertinent. Greg Williams, who publishes ***HortIdeas*** *($10/year [12 issues] from Route 1/Box 302, Gravel Switch, KY 40328), a bargain newsletter which digests the most innovative ideas in horticulture, has a large collection of old books about plants. He suggests libraries and bookstores as a legitimate field of botanical research. A few of his favorites follow.* —*Kevin Kelly*

The Power of Plants
Brendan Lehane, 1977; 288 pp.

A coffeetable spectacular with spectacular illustrations and (surprise) lucid prose. Wonderfully chaotic, with brief (usually two-page) sections on topics like "Life Among the Roots," "Origins of Staple Plants," "The Golden Age of Herbalism," and "The Language of Flowers."

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The gods of early man were plants, and our gods — Christian, Muslim, Hindu, Buddhist — are inseparable from plants still. At the dawn of each of the modern great religions a tree grows, the tree of the universe, of paradise, of the knowledge of good and evil. Woven into our worship, plants are part of our other spiritual rituals. They brighten festival and carnival, dances and parades, the celebrations of birthdays, marriages, victories. If plants are absent, we invent them. In prose and poetry, paint and stone, they continue to enhance our lives in winter, at night, in the middle of asphalt cities. And when a young lover wants to express the most fervent, truthful passion he has ever felt in his life, he dispenses with dictionaries and learning, and the cunning arts of rhetoric, and says it with a rose.

A Gardener Touched With Genius
Peter Dreyer, 1975; 322 pp.

This is an even-handed, reasonably complete, and above all readable account of the life of plant breeder Luther Burbank, whose actual accomplishments were eclipsed by hype. Dreyer manages to trim the legends down to a human scale without losing admiration for Burbank.

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Luther allowed his ambitions free rein. He had plans to improve ornamental trees and shrubs, to look into the possibility of breeding better lumber trees, to produce finer varieties of flowers and to give the farmers and gardeners of the world a whole range of earlier, sturdier, more productive fruits and vegetables. Everywhere he looked in the fields and gardens around him he saw potential for improvement. What were his assets? He felt he had a pretty good background in scientific reading. He had been interested in plants all his life and had behind

Enduring Seeds

*In his third book, ethnobotanist Gary Nabhan continues his exploration of American Indian farmers and their crops. (The preceding books are **The Desert Smells Like Rain**, reviewed in **CQ** #37, p. 26, and **Gathering the Desert**, reviewed in **WER** #50, p. 72.) Nabhan collects seeds from native American food crops and distributes them to Indians and others willing to grow and thus preserve these often rare and endangered varieties. He is also a good writer, and this time travels far beyond the Sonoran desert bioregion. This collection of essays is filled with good stories of interesting people in out-of-the-way places. It is history with roots in the soils of the present.*

—Richard Nilsen

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Modern agriculture has let temporary cheap petrochemicals and water substitute for the natural intelligence — the stored genetic and ecological information — in self-adjusting biological communities.

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For centuries, local seed-saving was the norm. Ethnobotanist Janis Alcorn has described how traditional farmers follow unwritten "scripts," learned by hand and mouth from their elders, that keep agricultural practices relatively consistent from generation to generation. Most land-based cultures have such scripts that guide plant selection and seed-saving. Each individual farmer might edit this script to fit his or her peculiar farming conditions, but the general scheme is passed on to the farmer's descendants. Thus, the crop traits emerging through natural selection in a given locality are retained or elaborated by recurrent cultural selection.

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Some native farmers don't necessarily plant the same kind of corn every season, but vary their selection depending upon the weather. By having caches of other seedstocks for particular weather conditions, farmers can hedge their bets. Anthropologist Tim Dunnigan has told me of this kind of crop switching among Mexico's Mountain Pima, relatives of the Pima and Tohono O'odham of Arizona. They keep several varieties of maize on hand, including a quick-maturing corn in case spring drought should delay planting, thus shortening the growing season. Other Mountain Pima maize varieties can be planted earlier in cool, wet springs, but need five months to mature.

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Why, [anthropologist Edward] Spicer asked, have some peoples succumbed to acculturation and assimilation, while others have endured culturally? When he began to compare the cultural traits of nine enduring ethnic groups, Spicer quickly found that easy assumptions — that the "keepers" forbid intermarriage with other cultures, or defended their homeland against all odds, or maintained a language to encode secrets indecipherable to outsiders — all fell by the wayside. Most of the enduring peoples had lost some of their genetic identity, some of their original territory, and, often, much of their native language. . . .

What counted, Spicer found, was that if enough members of a community express an affinity to shared symbols and values through time, across the generations, their culture will remain viable. This common covenant must be constantly transmitted and reinforced by the legends, codes of behavior, ceremonial songs and dances, rituals, vigils, and homages to places sacred to that particular culture. Once inoculated with the values held within their community, children acquired a certain resistance to the trappings of the dominant culture. Perhaps these values act as "cultural antibodies," which react to outside influences in such a way as to overcome their negative effects.

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It was once thought that the entire vegetable repertoire of early North American gardeners was imported, part and parcel, from Mesoamerica. Although it still serves certain geopoliticians to claim that North America borrowed all its crops from other lands, this notion finally has bitten the dust. Much earlier than the arrival of Mexican corn varieties about 1500 years ago, Eastern Woodland horticulturists domesticated several seed plants on their own, such as sumpweed, giant ragweed, and sunflower. Combine these natives with later introductions of common beans, bottlegourds, tobacco, and goosefoot, and Eastern Woodland farmers had a wide array of crops in use by 1000 A.D.

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Ironically, it is not the International Potato Center in Lima, but a monolingual Quechuan speaker who has been most successful in selecting new potato varieties for high-altitude environments. Over the last few decades, Eugenio Aucapuma has become a major source of good-tasting, climatically adapted dark potatoes, developed through backyard selection. Christine Franquemont has documented how one of Aucapuma's folk varieties, known as Papa Olones, has spread from Mr. Aucapuma's patch of mixed land races, wild species, and family selections. Because Aucapuma was selecting for taste, color, and hardiness — all qualities that most Quechuan farmers value in potatoes — Papa Olones rapidly passed from his patch to his neighbors', and then from the Olones valley to similar sites throughout the mountains of southwestern Peru.

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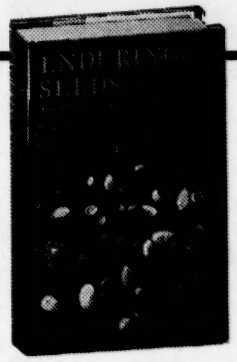
Early in this century, USDA botanist G. N. Collins discovered that Hopi corn had morphological adaptations to deep-seeded, clumped plantings in sand dune environments. Among these adaptations was the robust seedling's rapid elongation between the root and the first foliage leaf of the developing plant, allowing it to emerge from beneath twelve inches or more of sand!

Hopi farmers did in fact plant their corn seed eight to twelve inches deep, for the sand stays moist at this depth. The seedlings that emerged in May could endure on the residual moisture from winter and spring storms, until the summer rains began.



Enduring Seeds
Gary Paul Nabhan, 1989; 225 pp.

$18.95 ($20.45 postpaid) from North Point Press, 850 Talbot Avenue, Albany, CA 94706; 415/527-6260 (or Whole Earth Access).

him ten years of practical experience working with them. He thought he had the fundamental rules of plant breeding pretty clearly worked out. Even so, he sometimes wondered, "how could one man, in a single lifetime, have much of an influence on the vegetable world, when about all that most experimenters in any line had been able to do was to specialize on one single branch and die leaving the work unfinished?

Tree Crops
J. Russell Smith, 1950; 408 pp.

*Smith's arguments in favor of using trees for a no-tillage agriculture were persuasive enough to divert me into horticulture. "Agroforestry" has become a big deal in the subtropics and tropics, but annual crops still reign in North America. Who will develop honeylocust and persimmon into staple crops? Someone who has read **Tree Crops**, for sure!*

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We need a new profession, that of the botanical engineer, which will utilize the vital forces of plants to create new mechanisms (crop-yielding trees) . . . the crop-yielding tree offers the best medium for extending agriculture to hills, to steep places, to rocky places, and to the lands where rainfall is deficient. ■

The Science and Romance of Selected Herbs Used in Medicine and Religious Ceremony

African ethnobotany is little understood by Europeans, and even less investigated by American botanists. Anthony Andoh, an ethnobotanist from Ghana, trained at London's Kew Gardens, has compiled and self-published a unique work that reflects a lifetime of studying plants and their many dimensions.

Andoh's focus is on the magico-spiritual plants used in the ancient Ifa *religion of West Africa. When the imported slaves brought this divinatory plant-based religion to the New World, it absorbed the Roman Catholic saints and symbols, people of Spanish, Portuguese and Native American descent, and became* Santeria, *still a very active faith, particularly in the Caribbean and Brazil. The practitioners had to find plants that corresponded in their qualities to the African plants traditionally used, and therefore did extensive intuitive ethnobotanizing. A good number of the plants are either chemically or symbolically "active in the mind." Andoh describes nearly 500 species of plants in 75 families, some of which occur on other continents unrelated to these religions. His dedication to recording all collectible data on every plant of known usage is admirable, and a model for the study of plants in many other ecological and socio-religious systems.*

The index to common names of plants in English, Spanish, West African, and Asian usage could be most useful in many situations where confusion exists due to the lack of scientific nomenclature in the field. A fair bit of basic botany could be learned from the appendices.

—Kat McKenna

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MELIA AZADERACH L. *Meliaceae*

Common/Vernacular Names: *English:* China berry, Persian lilac, West Indian lilac, Bead tree, Pride of India, Hog bush, Bastard cedar, Tree of Paradise; *Spanish:* Paraiso, Lila, Pasilli, Arbol Santo; *Africa:* Nassara, Eke-oyinbo, Itchinkurdi (Nigeria); *China:* Lien, K'n-lien, Sen-shu. . . .

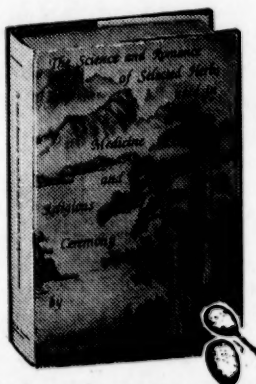
Legend, Lore and Romance: This is one of the important ingredients of the *"Omiero,"* the sacred elixir of initiation ceremonies. . . .

The active principle of this plant is the yellowish-white body soluble in alcohol and scarcely soluble in cold water, though it is more likely to be a substance still to be isolated which happens to be extracted with the resinous body. This explains the reason for the plant's use as a fish poison, for example, in China, by a water soluble substance, and why a water infusion is used as a vermifuge in India. This unknown substance is destroyed by boiling. An overdose of the extract produces symptoms like those of **Atropa belladonna** poisoning, and after stupor, death may follow. Recently, a toxic alkaloid, tazetine ($C_{18}H_{21}NO_5$) has been reported in the fruit and bark. The crushed, dried fruit has yielded azadirachtin, which is known to inhibit feeding of the desert locusts. The same property may be present in the leaves.

The tree exudes a clear, tasteless soluble latex which coagulates rapidly into gum which is used for colds, coughs and catarrhal fever, especially in India. The tree is used medicinally by Arabs and Iranians, the name azaderach suggesting poisonous properties. . . .

Brushing the teeth with chewed twigs is common practice in India; this refreshes the mouth and arrests sore mouth, sore throat, gum and tooth troubles. . . .

Melia azaderach.



The Science and Romance of Selected Herbs Used in Medicine and Religious Ceremony
Anthony Andoh, 1986; 324 pp.

$27.95 ($30.45 postpaid) from The North Scale Institute, 2205 Taraval Street, San Francisco, CA 94116; 415/759-9491 (or Whole Earth Access).

Evolution of Crop Plants • Food Plants for the Future

Most of the food plants we now grow are human inventions. (I'll be eternally grateful to the domesticators of mangoes.) I set into reading this classic text, ***Evolution of Crop Plants****, with uncharacteristic piggishness, devouring the gossip of the fascinating and quirky personal histories of Mr. Carrot, Ms. Cantaloupe, and other vegetable characters, and found afterwards that I had new opinions of these formerly dull-seeming table companions. Their incredible global wanderings and transformations from vague horticultural urges to everyday staples are a history of true symbiosis between humans and plants. Enlightening textbook.*

Domesticated plants are a kind of technology. Their applied evolution continues. Established crops are overhauled, fine-tuned, or redirected. Forgotten crops are remembered. ***Food Crops for the Future*** *is a very readable summary of potential new food staples and new methods, including wiz-bang hi-tech ones, of utilizing the maximum ability of a species to produce food. Long live the many faces of Old Man Potato, past and future!*

—Kevin Kelly

Evolution of Crop Plants
N. W. Simmonds, Editor
1976; 339 pp.

$39.95 postpaid) from John Wiley & Sons/Distribution Center, 1 Wiley Drive, Somerset, NJ 08875-1272; 201/469-4400 (or Whole Earth Access).

Food Crops for the Future
Colin Tudge, 1988; 225 pp.

$19.95 ($21.95 postpaid) from Basil Blackwell, Inc. c/o Harper & Row Publishers, P. O. Box 1655, Hagerstown, MD 21741; 800/638-3030

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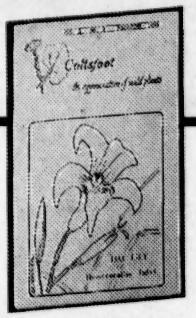
That leaves may provide a significant source of protein has been emphasized in particular by N. W. Pirie of the Rothamsted Experimental Station, United Kingdom. There is far more protein in a hectare of green leaves than in a hectare of cereal or potato, and far more than could be produced in that same hectare if it were devoted to livestock. To be sure, as Mr Pirie points out, the protein in leaves tends to be too dilute for human beings — diluted both by water and by fibre. Unlike cattle, we are not equipped anatomically to eat enough leaves to satisfy daily protein needs; and a secondary problem is that many leaves tend to be mildly toxic, and individual types probably should not be eaten in vast amounts. For such reasons Mr Pirie has suggested that the protein-rich pulp should be extracted from leaves, and served as human food, while the fibre-rich residues could feed cattle. There have been and are several enterprises in train for extracting leaf protein. *—Food Crops for the Future*

Coltsfoot

This is a small reader-generated newsletter about using wild plants for both food and medicine. Articles on foraging and plant identification are included with information and recipes on what to do with a plant once found — from good soups to herbal poultices. The bookish end of herbal lore gets coverage, as do reviews of new plant books, particularly the regional ones that don't get much coverage elsewhere. ***Coltsfoot*** *is amateur in the best sense: people writing about wild plants for the love of it.*
—Richard Nilsen



Coltsfoot
James Troy,
Editor.

$10/year (6 issues) from Coltsfoot, Route 1, Box 313A, Shipman, VA 22971.

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Lamb's quarters (*Chenopodium album*) is found in gardens and cultivated areas in every state in the United States and most of the world. I have seen this "weed" in sidewalk cracks from Schenectady to Syracuse, and from New York City to Phoenix, Arizona. . . .

I farm a few lamb's quarter bushes for a summer's supply. Only three plants, properly picked, will feed several people for months. Farm the bush by pinching the younger, smaller shoots of the plant limbs. As you continue to do this, picking leaves, stems, seeds and all, the plant will reproduce several limbs in place of one. In a few weeks, your weed plant is a food bush — lush and ready for serious harvesting. A few bags, steamed and frozen, yield a winter's supply of greens, from just a few lamb's quarter bushes.

The leaves may be eaten raw or cooked as spinach, in conventional ways, and dried for flour and stored. Roots can be used as a soap substitute — just wet hands and scrub around root. Chop up the whole plant, steam and serve hot as a vegetable or eat raw in salads. Steam one minute until wilted for freezing. Seeds are best removed by rubbing your palms together around the seed spires and scattering them into a cloth surrounding the plant. You can harvest all your bushes this way. The seeds will replenish themselves easily.

The Cook's Garden

One of the most interesting parts of the business of raising food is watching small growers find and occupy new market niches. This seed company was begun by two market-gardeners, and like their garden, it specializes in salad greens. If it is green and by any stretch of the imagination could go into a salad bowl, you'll likely find it here. The first page of the catalog offers eight kinds of basil plus a recipe for purple pesto. There are 50 kinds of lettuce, 20 chicories, plus salad mixes you can raise as a cut-and-come-again crop outside the kitchen door — at suppertime you simply snip off a salad's worth of greens with a scissors and the plants keep on growing more. There is also a small and careful selection of unusual varieties of other vegetables, plus supplies for market-garden-scale production. Like Shepherd's (reviewed below), this catalog is aimed both at the cook-gardener and the small-scale commercial grower, and both companies also provide bulk seed price lists. *—Richard Nilsen*

The Cook's Garden
Catalog **$1** from The Cook's Garden, P. O. Box 65, Londonderry, VT 05148; 802/824-3400.

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What exactly is Mesclun?

This French sensation seems to have burst onto the American gardening scene like a self-sown annual, but in reality is more like the flush of growth on an established perennial. Most of the plants used to make mesclun — or salad mix — have been in American gardens since the first immigrants arrived in the 1600's: chicory, rocket (arugula), cress, chervil and lettuce.

To create your own personal mesclun all you need is a garden of miscellaneous greens (mesclun and melange are both French words that mean mixture or miscellany) and a vivid imagination. Combine the greens you like and toss with a light vinaigrette for a supreme garden salad.

Shepherd's Garden Seeds

This seed catalog specializes in offering the best market-garden vegetable varieties from Europe and Japan. Market-garden varieties tend to deliver flavor, tenderness and other qualities that make them superior for eating fresh. This is in contrast to most American commercial varieties, which tend to be bred to look uniform, ship and store well, and ripen all at the same time. This is a bigger catalog than The Cook's Garden (reviewed this page), and also includes a good selection of flower seed and vegetables suited for container gardening. *—Richard Nilsen*

Shepherd's Garden Seeds
Catalog **$1** from Shepherd's Garden Seeds, 30 Irene Street, Torrington, CT 06790; 203/482-3638.

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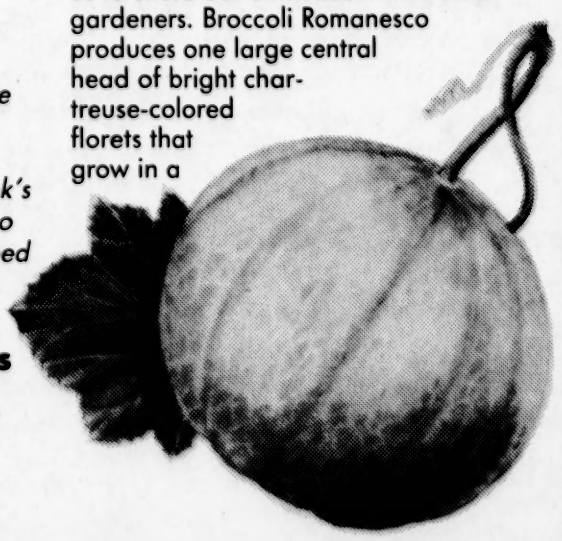
BROCCOLI ROMANESCO (Italian — 100 days). An heirloom Italian broccoli whose unusual, beautiful shape and delicate flavor have long been a favorite of ours. We have found an established, reliable Italian seed source, enabling us to share our enthusiasm with other gardeners. Broccoli Romanesco produces one large central head of bright chartreuse-colored florets that grow in a pointed, conical form. It has a delicate, sweet flavor, milder than the "regular" broccoli we see here in the U.S.A. It is delicious quickly steamed with a bit of butter and lemon for emphasis, and it freezes well for post-season enjoyment.



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CHARMEL (78 days). New This Season. For the French, Charentais are the only melons worth eating. Our hybrid Charmel is a fabulous new Charentais. Its plump, 2-pound fruits have smooth gray-green exteriors, small seed cavities and deep orange flesh with a rich complex flavor and wonderful flowery aroma. Charentais are the sweet, fine-textured melons traditionally served with prosciutto. . . . Fusarium-resistant Charmel is an extremely productive and vigorous variety with good crack resistance and the earliest-ripening fruits we've seen in a Charentais.

IT'S A JUNGLE OUT THERE

by Dennis J. McKenna

Biochemical Conflict And Cooperation In The Ecosphere

READERS OF THIS ISSUE of *Whole Earth Review* will find abundant references to the vast number and variety of chemicals to be found in plants. The importance of plants — both in the ecosystem and in human affairs — derives in large measure from their biochemical versatility.

Plants As Power Brokers

The process of photosynthesis — the conversion of electromagnetic energy (sunlight) into usable chemical energy (carbohydrates) — provides the fuel that literally drives the biosphere and, in the bargain, plays a critical role in maintaining the optimal balance of atmospheric gases crucial to life. In addition to giving plants the decidedly crucial role of power brokers to the entire ecosphere, the process of photosynthesis enables plants to convert "light" into "stuff" by a kind of biochemical legerdemain; and that particular hat-trick has some very important consequences, both for the plants themselves and for the non-

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Dennis McKenna is the academician and scientist of the McKenna mafia. A neuro-pharmacologist who began his career in religious studies, he early recognized the importance of visionary plants for understanding the religious impulse in human beings and so turned to botany. From there it was but a step to the chemistry of plants with a history of human usage. Later he went to NIMH to acquire workbench experience and a hands-on understanding of neuro-psycho-pharmacology. When not writing for WER he divides his time between characterizing new receptor sites at Stanford's Neurology Department and his wife Sheila and 16-month-old daughter Caitlin. —*Terence McKenna*

photosynthetic organisms which interact with plants, i.e., virtually everything else.

For one thing, it means that plants operate on a nearly unlimited energy budget. Since they can harness sunlight to make their own food out of readily available raw materials in the environment — water, nitrogen, a few other soil nutrients, and carbon dioxide — they can easily manufacture a surplus of usable chemical energy. When this excess is stored in fruits, seeds, or roots, then the plant becomes an attractive target for other consumers that have not mastered the art of photosynthesis.

In many instances, consumption of the plant or some part of it by sundry predators plays an important role in the plant's reproductive strategy — by serving in seed dispersal or flower pollination, for example. In still other instances, the plant would just as soon not share its biochemical largess with every non-photosynthetic freeloader that comes looking for a free meal; avoiding infection by fungi or consumption by insects are common examples. In order to combat such unwanted assaults on their integrity (and to attract desired consumers), plants have made creative use of their biosynthetic capabilities; plants' response to the evolutionary struggle has been to elaborate a formidable array of so-called "secondary" compounds.

The Primary Role Of Molecule Messengers

These "secondary" compounds — toxins, repellants, metabolic poisons, odors, pigments, attractants, etc., have been evolved by plants for the sole purpose of influencing the behavior of other organisms in the environment. These compounds are "secondary" only in the sense that they are not (usually) part of primary metabolism; they are not (usually) proteins, carbohydrates, nucleic acids, lipids, or any of the more-or-less universally distributed chemicals found in almost all organisms and which are essential to life processes. Secondary plant chemicals may be chemically related to primary metabolites and indeed usually arise from a kind of biosynthetic detour departing from some primary metabolic pathway. These plant chemicals are "secondary" only in this sense of their relationship to the products of primary metabolism; they are anything but secondary in the important roles they play in mediating and regulating the interactions of plants with the other organisms in their environment.

Since plants, by and large, are rooted to one spot, their behavioral repertoire is fairly limited; the "fight, flee or fuck" response, so characteristic of animal behavior, is in most cases not even an option for a plant. Faced with this dilemma, plants have responded by evolving into biochemical virtuosos; to paraphrase one famous botanist, "plants have substituted biosynthesis for behavior." In the process of chemically orchestrating their environment, plants also drive evolution by spurring potential consumers, symbionts, and pathogens to come up with ever more elaborate strategies to neutralize plant biochemical defenses or even turn them to their own advantage.

Biochemical Diversity Is A Form Of Communication

The staggering biochemical diversity we find in the plant kingdom — and the equally staggering array of adaptive responses evolved by other organisms — is the result of this subtle molecular give-and-take. We humans are the unwitting beneficiaries of this biochemical war, since the weapons evolved to fight this billion-year battle also happen to be the plant products we find most useful as medicinal and recreational drugs, spices and flavors, cosmetics, industrial chemicals, pesticides, and, in some instances, food, although this latter category more often refers to products of primary metabolism, such as starches and proteins. Human interactions with plant secondary compounds, from the "crack" wars on the streets of our cities to the search for a cure for AIDS or cancer, have important consequences, both for us and for the plants.

The term "secondary compound" is a misnomer, a holdover from the days when the role of plant chemicals in modulating the ecosystem was not well understood. Plant chemicals which did not arise from some primary metabolic process were thought to be the equivalent of animal wastes. Secondary compounds did not serve important internal metabolic functions (or such functions were not recognized) and hence were collectively heaved onto a kind of metabolic garbage dump; plants made secondary compounds as a way of disposing of the biochemical wastes resulting from their own furious, light-driven metabolic activity. The fact that secondary compounds are usually synthesized in metabolically active parts of the plant and that their biosynthesis is tightly regulated by diurnal, seasonal, and environmental factors argued against the metabolic-waste hypothesis and in favor of the notion that these chemicals performed some adaptive ecological function for the producing plants. The term "allelochemical," from the Greek root "Allelo" ("other"), was introduced as a less pejorative and more accurate term than "secondary compound."

Allelochemicals are made by organisms to influence the growth, behavior, health, or population biology of other organisms. These chemically mediated interactions between species are the focus of the relatively new science of chemical ecology. Allelochemistry is important for plants but is not limited to them; the pheromones produced by insects in order to attract a mate, or mark territory, or the pungent cloud released by a skunk to frighten away a predator do not directly involve plants but nonetheless fall within the scope of chemical ecology. ►

The Monarch butterfly (*Danaus plexippus, *left) uses plant allelochemicals to make itself bitter and unpalatable to predators. The Viceroy (*Limenitis archippus, *below) is free of distasteful compounds, but its mimicry of the Monarch discourages potential predators.

MASTER ALLELOCHEMISTS

Plants are master allelochemists; they are a crucial element in the majority of the allelochemical events taking place in the ecosystem. Plants can even be important indirect mediators of allelochemical interactions. Monarch caterpillars, for instance, are specialist feeders on species of milkweeds which contain toxic cardiac glycosides similar to digitalis; the caterpillars, themselves immune to the toxin, sequester the glycosides in their bodies as they mature into butterflies. Birds which would otherwise prey on them find the butterflies unpalatable because of the bitter plant glycosides they contain. Thus in this instance, a specialist feeder has borrowed a defensive allelochemical from a plant and adapted it to its own purposes. The literature of chemical ecology is rife with similar examples.

HOW TO IDENTIFY AN ALLELOCHEMICAL

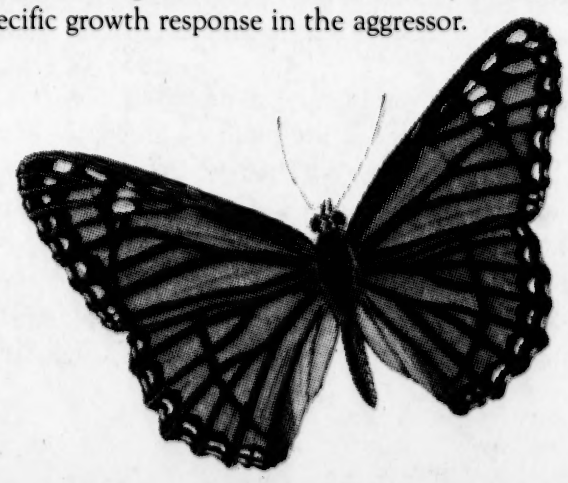
Most allelochemicals serve one or more of the following functions:

Semiosis — These allelochemicals function primarily as signals to other organisms. The message transmitted may vary from "Stay away!" to "Eat me," but the general intent is to alert other organisms, using chemical cues, that there is something in the environment that requires attention, at least, and often a response as well. The pigments that give many flowers and fruits their characteristic bright colors act as signals, attracting pollinators to the flower, or birds or mammals to eat the fruit and disperse the seeds. Other semiotic chemicals send their message through nonvisual sensory pathways; a flower's fragrance, for example, can function as an attractant to pollinators, while the same fragrance might be perceived as distinctly unpleasant to an unwanted predator. The bitter taste of many alkaloids can be a signal to a foraging herbivore that it had best look elsewhere for its meal. The same alkaloids that discourage the herbivore may act as a feeding inductant to a specialist insect that has evolved enzymes capable of detoxifying the alkaloids; alternatively, that insect may sequester the alkaloids in its body, where they serve as defensive protective compounds by making the insect unpalatable to birds and other predators.

Competition — Competition includes both defense and aggression. Defensive allelochemicals function as repellants, escape substances, and neutralizers, and serve mainly to protect the producing organism; they may or may not have detrimental effects on the target organisms. Aggressive allelochemicals, on the other hand, are designed to inflict harm on the receiving organism, although they may serve a defensive function in doing so. A plant which releases a seed-germination inhibitor into the surrounding soil is committing both an aggressive and defensive act; it is actively poisoning the seeds of invading species (and sometimes its own); but in doing so, it is also defending its habitat, by making invaders feel uncomfortable or unwelcome.

Symbiosis — Symbiotic chemicals help form and mediate relationships between organisms, either members of the same species, or members of different species. The resulting symbioses may have adaptive advantages for one or both partners, or they may be neutral or even harmful to one of the partners. Symbiotic allelochemicals include attractants and chemical lures, inductants, stimulants, and pheromones. Attractants and chemical lures function as signals to draw other organisms into close proximity to the producing plant; in the case of attractants, the responding organism may not be harmed and may even benefit from the interaction; a bee attracted to a flower in response to its color or scent makes off with the nectar, and pollination initiates the reproductive cycle for the plant. However, an insect drawn to a carnivorous plant by a chemical lure may not live to regret its decision.

Inductants and stimulants serve to modify growth in the receiving organism, again with potential advantages or disadvantages resulting to either the producer, receiver, or both. Certain soil bacteria, for instance, can invade the root cells of plants and cause them to form nodules; the nodules form a protected habitat for the bacteria, which, in turn, fix nitrogen from the atmosphere and make it available to the plant in a usable form. In this case, both partners benefit. Some carnivorous soil fungi snare rotifers or nematodes in loops of sticky hyphae which form only in response to a chemical secreted by the prey. In this case, the potential victim brings about its own demise by stimulating a specific growth response in the aggressor.

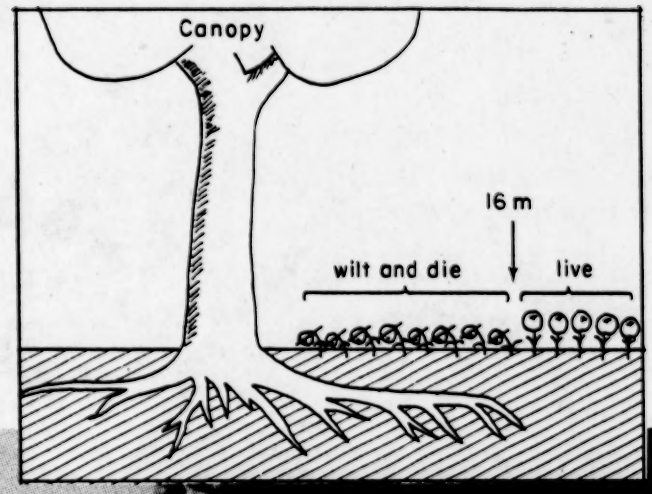


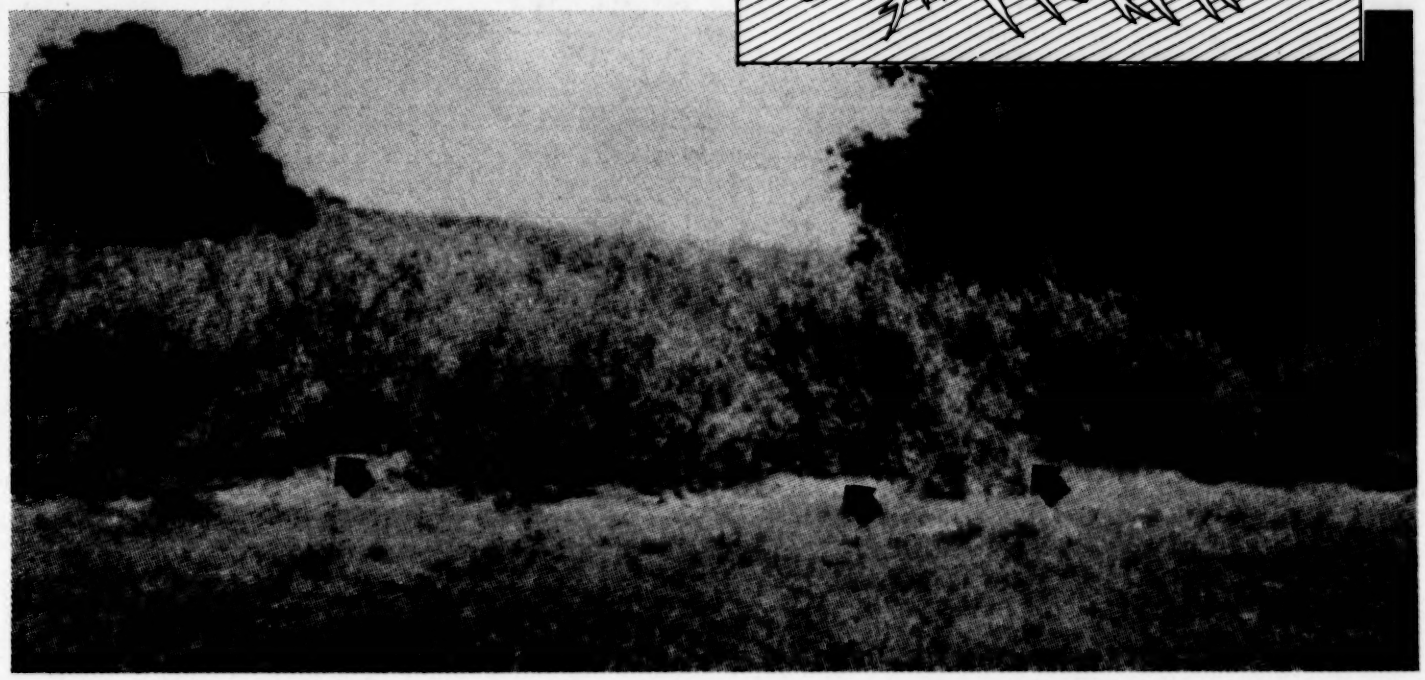
Camouflage and Mimicry

The effect of growing tomato plants in the vicinity of walnut trees.

The antagonistic effects of walnut have been recorded on such diverse plants as pine trees, potatoes and cereals. Walnut toxins will kill apple trees if they are planted too close.

(Below) California sagebrush releases terpenes into the soil, creating "no entry" zones (arrows) for competitor species. Allelopathy is the term for this common phenomenon.





PLANT SONGS

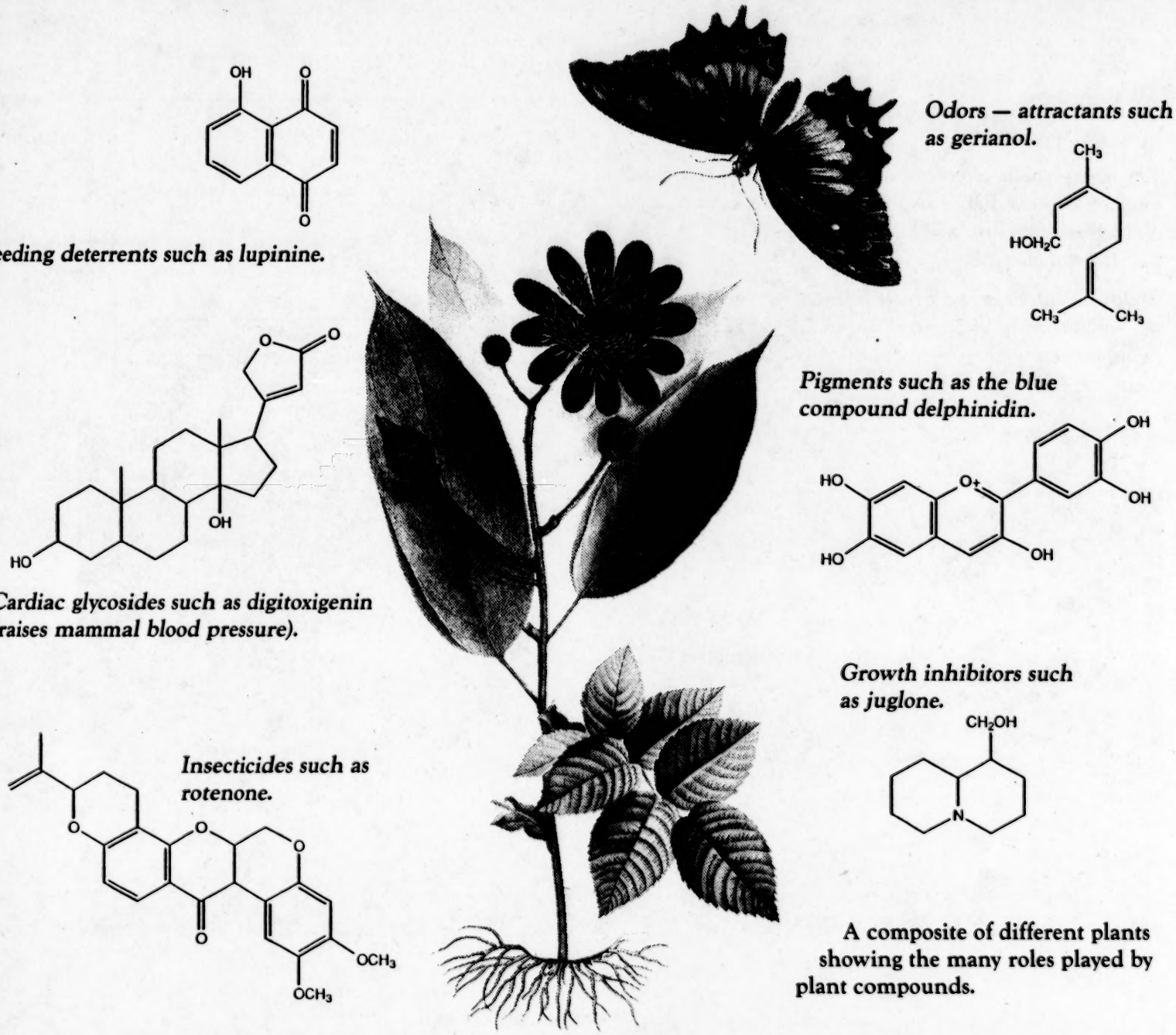
Pheromones — chemical messages exchanged between members of the same species — represent yet another class of symbiotic/semiotic allelochemicals. Insect pheromones play a role in reproductive behavior, in social recognition and caste differentiation, in alarm and defense, in territory and trail marking, and in food location. Pheromones exchanged by plants have not been nearly as extensively studied as insect pheromones, but they do exist and have similar functions. Douglas Fir trees, when attacked by a predatory beetle, respond by producing anti-feedant allelochemicals; however, Douglas Firs in a different part of the forest that has not yet been invaded will also simultaneously begin to produce the same allelochemicals, apparently in response to a chemical early-warning signal transmitted by their beleaguered fellows.

HOLISTIC BIOCHEMISTRY

Just as the chemical characteristics and functions of allelochemicals exhibit a great deal of overlap, complementarity, and diversity, so too do the mechanisms and targets of their biochemical actions. Most allelochemicals can have effects on multiple-cellular targets, and most have different effects depending on what organisms they are affecting, and what systems within those organisms.

The beta-carbolines, a group of alkaloids that is widely distributed in plants, provide a good example. They are potent inhibitors of monoamine oxidase, a liver enzyme that is important in mammals for detoxifying certain amines in the diet; however, beta-carbolines also inhibit the uptake of neurotransmitters into synaptic terminals; they can also jam the membrane ion pumps that make energy for the cell; in large amounts, they can bind to neurotransmitter receptors and cause tremors, convulsions, and hallucinations; when activated by UV light, they will kill bacteria and fungi; they can readily bind to DNA, and may cause mutations and cancer as a result; they are effective against intestinal worms. Thus beta-carbolines, a single type of plant allelochemical, can provide the producing organism with a whole armamentarium of defensive chemical weapons, effective against everything from mammals to bacteria.

This very diversity and selectivity of chemical actions often leads humans to select and use allelochemicals for our own purposes; we may not find the mutagenic properties of beta-carbolines particularly useful, but their other properties may make them valuable as antidepressants, hypertensives, hallucinogens, antiparasitics, antibiotics, or all of the above. Nor should we overlook the fact that plants which produce chemicals we find useful may benefit significantly as a result. A useful plant is more likely to become domesticated and widely cultivated; for the plant, this amounts to an evolutionary advantage. This process, in which we cultivate a plant in order to exploit some product it produces, such as a valuable drug, is also a symbiotic interaction mediated by allelochemicals. ►



Why Plants Can Be Psychoactive

Allelochemicals also display great diversity and selectivity in the cellular and metabolic processes they can effect. Psilocybin, the hallucinogenic alkaloid in magic mushrooms, potently antagonizes the action of the neurotransmitter serotonin; in man, this action affects higher brain functions and leads to a hallucinogenic effect; but the same action may result in paralysis in a snail or slug (which love to feed on mushrooms) because in those organisms, serotonin transmits the nerve impulse at the neuromuscular junction.

Like psilocybin, many plant allelochemicals affect the nervous system; we value (or abhor) them for their effects on the human nervous system, but that is incidental to the plant — they may have originally evolved to affect the nervous systems of insects or herbivores. Other plant allelochemicals are known which can affect virtually every cellular or metabolic process, including cell membranes, nucleic acid and protein biosynthesis, cell division, respiration, signal transduction, and enzyme activity; and it is these effects on cellular activities that lead to their macroscopic effects on multicellular organisms and sometimes even communities of organisms; effects on reproduction, growth and differentiation, hormonal responses, immune function, nervous function, cardiovascular functions, social interactions, genetic regulation, and so on.

The First Communication Network

In our day-to-day lives, most of our social interactions consist of encounters with members of our own species. The situation is quite different for a plant. Plants have to deal constantly with a whole host of different species, all of which are struggling to secure their own place in the ecosystem. Plants have to compete with other plants, both of their own and of other species, for space, soil nutrients, and sunlight; they have to thwart invasions by armies of pathogenic soil microbes and fungi, and at the same time they have to form beneficial symbioses with others; they have to avoid being eaten by some insects, and they have to coax others into helping out with their pollination and seed dispersal; they have to come to similar terms with herbivores, including intelligent primate herbivores like us.

They can manage to survive by being useless but harmless, or they can seek some more complex accommodation that may benefit both parties. On top of all this, plants have to accomplish all of these complex interspecies social interactions without being able to talk or even to move (at least very quickly). Forced to cope with this situation, it is little wonder that plants have capitalized on their biochemical inventiveness. Lacking a complex behavioral repertoire, plants rely on biosynthesis to mediate their relations with the

world around them, and have developed an elaborate chemical vocabulary for that purpose.

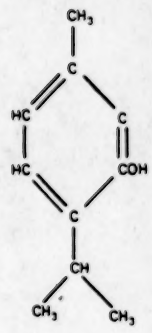
Although a plant sitting in a field in the sun or growing in the shade of a forest may not seem to be doing much, do not be deceived by appearances. It is a veritable nerve center of chemical cross-talk. It is using pheromones, growth inhibitors, and metabolic poisons to communicate with other plants, mark its territory, and carry on its sex life; it is using pigments, odors, attractants, repellants, feeding inducers, anti-feedants, and toxins to carry on a complex dialogue with the many insects in its environment, both those it needs to attract for its own symbiotic ends, and those it would just as soon avoid; it is sending a similar barrage of chemical messages to the microbes, fungi, nematodes, and other denizens of the soil near its roots — some it wants to get friendly with, others it wants to drive away, still others it wants to annihilate. Foraging mammals and other herbivores, all potential consumers of the plant, get similar signals. The plant may need to be approached, or to have certain parts of itself consumed, by foragers to complete its life cycle or to facilitate seed dispersal, and it has chemical strategies to make its accessibility known; in other cases, it just wants foragers to leave it alone, and it has chemicals to broadcast that warning, as well.

In turn, most of the other organisms that are the targets of this chemical barrage have their own store of snappy chemical replies. The nuances that color these chemical conversations have all the subtleties of human interchanges, and the breadth of the topics addressed can be equally wide — ranging from arms negotiations to conspiracy to seduction. All this chemical communication goes on at the level of a low murmur, and the casual observer is usually oblivious to it (even though he may be participating in it by admiring the color of a flower or enjoying its scent); to him, nothing very much at all seems to be going on.

The Spices Of Life

The thought of our mythical "casual observer," immersed in a cloud of allelochemicals and oblivious to it all, brings us to the interesting topic of the allelochemical connections between plants and people. Plants are utilized by people in many ways, and not all of them are specifically related to plant allelochemicals; but in a remarkably large proportion of instances, plants are useful to us because of their allelochemistry. The allelochemicals of importance to people either taste good, smell good, or feel good (and sometimes all three).

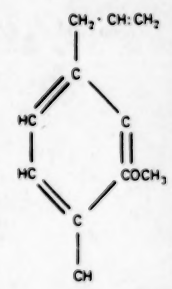
We can enjoy them in all sorts of ways, and often do without really ever thinking about it. We might use spices from various plants and herbs to dress up (or cover up) the taste of our meal; we may protect the crop plants that provide our food with insecticides based on allelochemicals; the wine we have with dinner has terpenes, tannins, flavonoids, and alkaloids floating around in it like some kind of molecular alphabet soup. If we enjoy a good cigar after dinner, that too is allelochemistry. Perhaps our dinner companion has substituted plant pheromones for her own by putting on perfume to enhance the romantic aspects of the evening; roses in a vase, anthocyanin pigments blazing, add the final touch. Indeed the perfume, cosmetics, and floral industries are multi-billion dollar enterprises whose size and power comes close to that of the cocaine cartels. And, like the cartels, their products are largely based on plant allelochemicals.



thyme

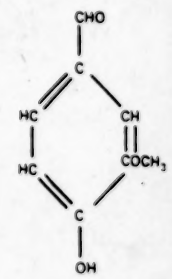
Using Allelochemicals The Way Insects And Plants Do

Human use of plant allelochemicals as drugs and toxins is an eco-chemical relationship, perhaps more complex but in principle no different than a plant-insect symbiosis mediated by plant alkaloids; in both the insect partnership and the human partnership, each member of the symbiosis gets something of value from the other. Much as an insect might sequester plant alkaloids in its body and thus escape being eaten, humans too have turned the toxicity of plant allelochemicals to their own advantage.



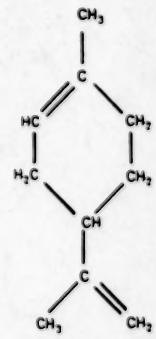
clove

In some cases, we use their poisonous potency much as the plants themselves do — to protect and nurture our valued crops, in the form of insecticides, herbicides, growth regulators, fungicides, and the whole range of agricultural chemicals — many of which are plant allelochemicals, while others are synthetic mimics of natural allelochemicals. In other instances, we use allelochemicals on ourselves. The multiple molecular and cellular machineries targeted by allelochemicals — and the astounding variety, subtlety, and selectivity of their interactions with those mechanisms — are the basis of modern pharmacology, and often involve applications of allelochemicals that are far from their original eco-chemical/evolutionary functions.



vanilla

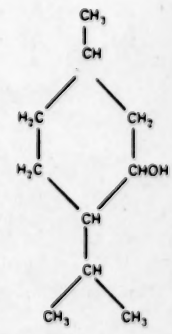
We use toxic alkaloids poisonous to cells to kill cancer; we use potent cardiac poisons such as digoxin, a plant glycoside, to treat congestive heart failure; we make birth-control pills and anti-inflammatory drugs from plant steroids. We use castanospermine, a plant growth inhibitor, as a drug to fight AIDS; we use physostigmine, one of the ordeal poisons of Africa, to treat Alzheimer's; we use aspirin for a simple headache, and ergotamine if it happens to be a migraine. We use antibiotics from fungi and plants to beat back the bacterial invaders in our own body. We use some plant proteins to suppress the immune system, and others to stimulate it. The list could be extended almost indefinitely.



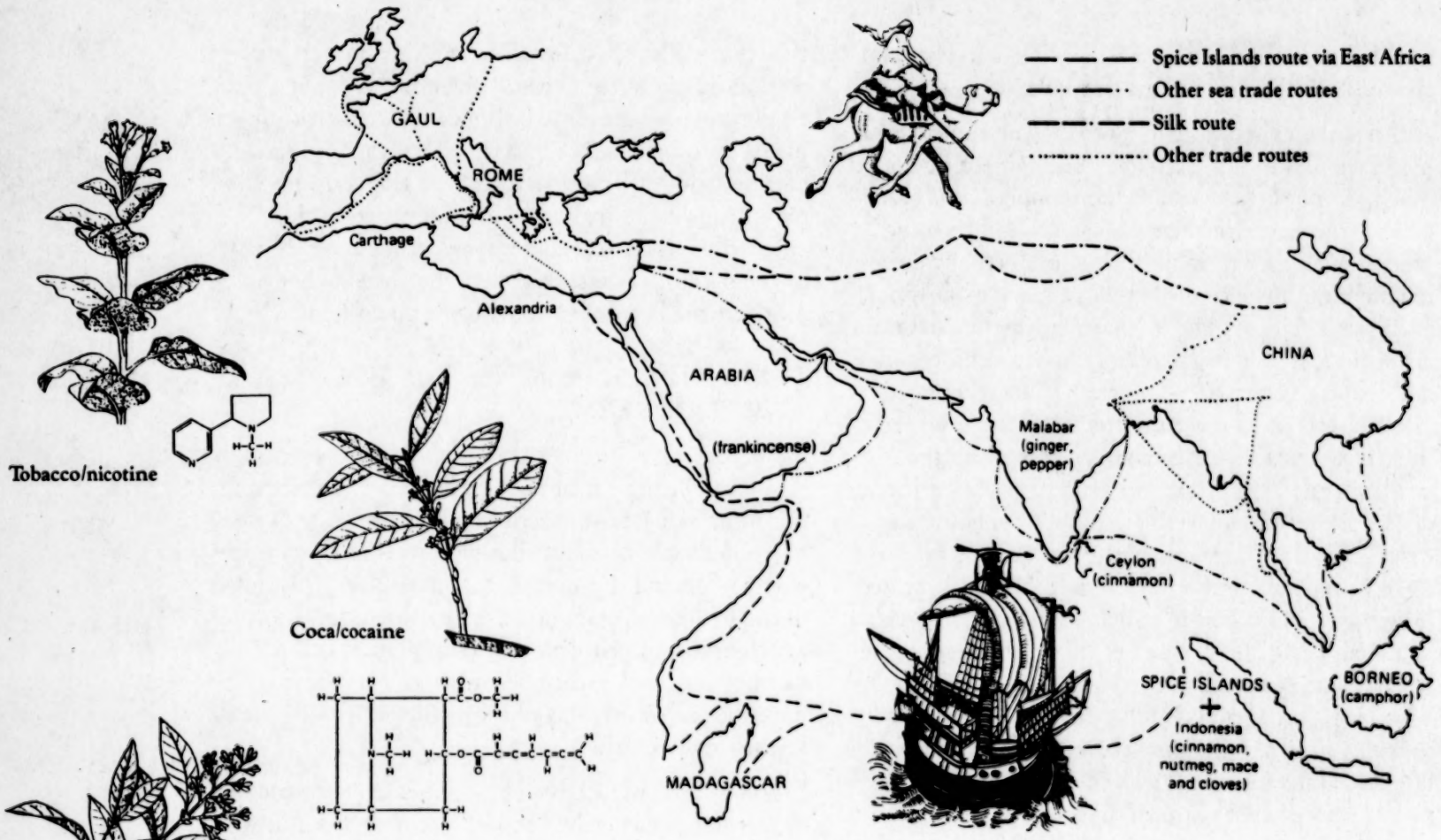
lemon

The Chemical Ecosphere

In the present era of synthetic organic chemistry, we have drugs for many purposes which are manufactured in the laboratory and not extracted from plants; but even in these instances, allelochemicals have made their contribution, because chemists often get their ideas for new compounds by looking at natural products as models or prototypes for new structures. Clearly, plant allelochemicals are as important for modern



peppermint



The spice trade of the fifteenth century ended the stasis of medieval Europe. Later, this same search for a variety of flavorings and drugs would turn New World plants such as tobacco, quinine and coca into major industries.

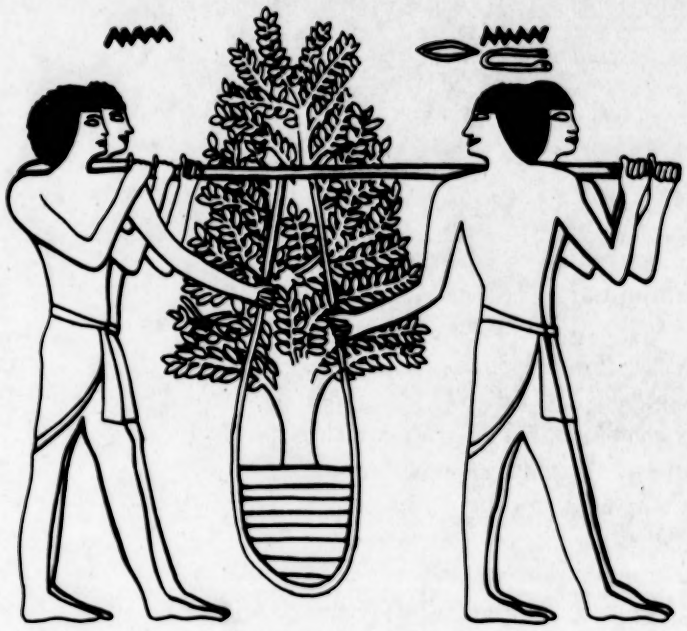
high-tech medicine and agriculture as they are for our palates and our shampoo; no matter how seemingly insulated we may think we are from the web of allelochemistry, there is just no getting away from it: We are immersed in the chemical ecosphere.

THE ECONOMY OF ALLELOCHEMICALS

The history of European expansionism in both the New World and the Far East is basically an eco-chemical scenario based on human interactions with food, spice, and drug plants. The New World was accidentally discovered as a result of a misguided effort to open a new route to the spice treasures of the Orient. Europeans' early encounters with the pharmacologically sophisticated New World natives, already well integrated into their chemical environment after sixty thousand years of allelochemical symbiosis, resulted in a host of mixed blessings; not only cocaine and tobacco, but chocolate and chile peppers, potatoes and tomatoes, curare and quinine. Five hundred years later, our society is still reeling from the impact of New World allelochemicals, even as we use them, abuse them, benefit from them and are poisoned by them. Anyone who doubts this should pause to reflect for a moment about the impact of tobacco smoking on our health-care system, or the influence of coca-dollars on hemispheric geopolitics. Similar reflections could just as well apply to the Old World allelochemicals of economic importance; Chinese tea and Asian opium, hashish from India and the Middle East, coffee from Ethiopa and cola nuts — the other half of Coca-cola — from the Congo.

Humanity — at least the part of it that regards itself as civilized — is still struggling to fashion some form of stable allelochemical relationship with the ecosphere. Other societies — less enamored of technology and more inclined to take the gifts of nature as they find them, rather than refining and modifying them into even more potent drugs and poisons — have long since come to terms with their allelochemical symbionts. The aboriginal inhabitants of the Amazon Basin, whose delicate ecological integration with their forest environment is now threatened, are examples of such societies. They, like us, have their spices, their medicinal and recreational drugs, their insecticides and cosmetics. Unlike us, however, they do not abuse their drugs, they do not contaminate their environment with pesticides, and they have, somehow, been able to use allelochemical plants without becoming toxified or enslaved by them. Everyone concerned with the use and misuse of chemicals — from drug-abuse counselors to toxic-waste managers — could well benefit from taking a closer look at the human chemical ecology of the Amazon. How do they manage to do it?

A woman, Queen Hatshepsut, sponsored the first plant-collecting expedition around 1500 B.C. Its goal was the collection of incense plants such as frankincense. Wicker baskets are still an excellent method of transporting plants over long distances.



Economic Botany

THE CO-EVOLUTION OF PLANTS AND HUMANS

Part of the answer has to be framed in evolutionary terms. Allelochemical relationships between plants and humans are very ancient. Allelochemicals in plants have existed far longer than humanity itself has been worthy of the name; and they have undoubtedly played an important, if unrecognized, role in human-plant co-evolution, just as they have done in mediating the co-evolution of plants and insects, plants and fungi, or plants and herbivores.

It is reasonable to assume that human evolution has been affected by allelochemical interactions as surely as insect evolution. Just how this has taken place, and the effect it has had over evolutionary time, is a matter for speculation; what effect, for example, might the presence of psychoactive alkaloids in the diet of early hominids have had on the evolution of the human nervous system? What impact might the chance ingestion of a psychedelic mushroom have had on the proto-hominid cosmology? It is unlikely we will ever know the real answers, but in light of the present importance of allelochemicals in human affairs, speculation about their possible prehistoric importance is not unwarranted.

What we do know, from the examination of aboriginal peoples such as those in the Amazon, is that humanity has slowly built up complex allelochemical relationships with plants over the course of evolutionary time. Whether we learned about the power of plants to heal and kill through trial-and-error experimentation on ourselves, or whether we learned by watching other animals, or whether some even more subtle co-evolutionary adaptive mechanism was responsible, we shall probably never know. What we do know, what the existence of the allelochemically adapted aboriginal societies tell us, is that it is possible for humans to achieve some kind of viable integration with their natural chemical environment; what we also know, from our often unsuccessful struggles to come to terms with the natural and man-made allelochemicals in the post-industrial environment, is that it is not easy. ■

FURTHER READING

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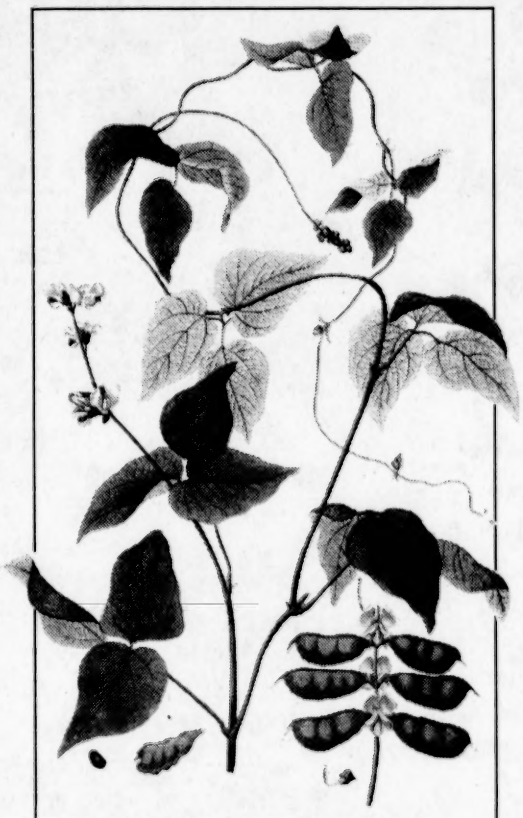
PLANT WISDOM RESOURCES

BY DENNIS McKENNA

In the Rainforest by Catherine Caufield, 1984. $11.95 ($13.70 postpaid) from University of Chicago Press, 11030 South Langley Avenue, Chicago, IL 60628; 800/621-2736. This book combines the best of scientific and investigative journalism, presenting the reader with an abundance of amazing details about rainforest ecology on every page while graphically portraying the role played by corrupt governments and greedy corporations in the systematic rape and devastation of one of the last and greatest natural resources of our fragile planet. The book left me feeling both saddened and angry, deeply moved by Catherine Caufield's articulate descriptions of the beauty and complexity of the rainforest, and overflowing with frustrated fury at the blindness and cynicism of the powers that permit and even encourage its wholesale destruction. If enough people became aware of the information presented so engagingly in this book, we might somehow muster the collective will to stop it.

Drugs and Foods from Little Known Plants — Notes in Harvard University Herbaria by Siri von Reis Altschul, 1973. $37 ($39 postpaid); **New Plant Sources for Drugs and Food** from the New York Botanical Garden Herbarium by Siri von Reis and Frank J. Lipp, Jr., 1982. $30.50 ($32.50 postpaid). Both from Harvard University Press, 79 Garden Street, Cambridge MA 02138; 617/495-2600. Not exactly edge-of-your-seat reading, these two volumes nevertheless are invaluable references for anyone with a serious interest in unexploited or underexploited botanical resources. Representing the fruits of more than ten years of armchair ethnobotany in the best sense, the books are a compilation of notations from herbarium labels on more than 5,000 species of plants in Harvard University and New York Botanical Garden herbaria. The information is arranged alphabetically by genera within families. An extensive Medical Index in the back renders this somewhat dense annotation accessible and interesting; one can readily locate anything from cosmetics to contraceptives in seconds. The sheer number of obscure plants which humans somewhere have found useful cannot fail to impress.

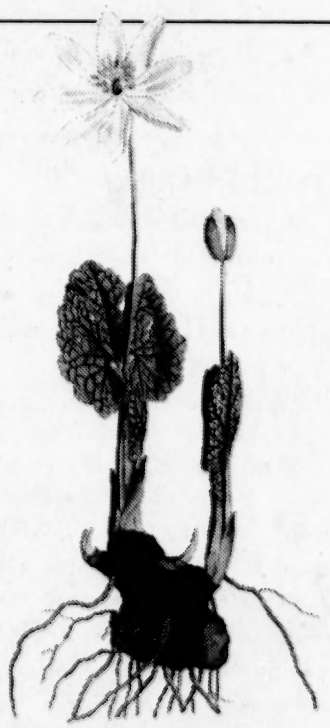
Economic Botany. Dues for regular membership in the Society for Economic Botany are $30/year and include a subscription to this quarterly journal. Applications for membership can be obtained from Economic Botany Business Office, P. O. Box 368, Lawrence, KS 66044. The official publication of the Society, this journal is "Devoted to the Past, Present, and Future Uses of Plants by People." Articles in a recent issue (July-September, 1988) included "Ethnomedicine in the Maroantsetra Region of Madagascar," "Plants used for Pest Control in China: A Literature Review," and "Vietnamese Culinary Herbs in the United States," among others. A valuable resource for those interested in alternative crops, medicinal plants, ethnobotany, and economically important plant species.



The Hyacinth Bean (Dolichos lablab) *is a legume with considerable future potential. The young pods have many culinary uses, while the foliage can provide hay and silage. Some medicinal applications are recorded, too. Probably native to Asia the Hyacinth Bean or "Lablab," as it is sometimes called, is now grown widely in India as green manure; it has been introduced to Africa, and spread generally in the tropics where it readily becomes naturalised. Several varieties are known, including a Caribbean climbing form in Trinidad.*

Planta Medica ($208/year from Thieme Medical Publishers, Inc., 381 Park Avenue South, New York, NY 10016). This bimonthly journal is the official organ of the Society for Medicinal Plant Research. The journal publishes review articles, original scientific research papers, letters, and notes related to phytochemistry, pharmacology, toxicology, biochemistry, physiology, cultivation, and applications of medicinal plants. Somewhat more technically oriented than *Economic Botany*, as the target audience includes chemists and pharmacologists as well as botanists; there is still much here that is interesting and comprehensible to the non-specialist.

Journal of Natural Products (formerly *Lloydia*). Official journal of the American Society of Pharmacognosy, available with membership in the Society for $45/year (students: $35). Published quarterly. For membership and subscription information, contact: David J. Slatkin, Ph.D., Treasurer, American Society of Pharmacognosy, School of Pharmacy, 512 Salk Hall, University of Pittsburgh, Pittsburgh, PA 15261; 412/648-8477. This excellent journal has evolved over the years from a publication catering to botanists and naturalists to one of the primary sources on the isolation and characterization of new chemicals from plants and other natural sources. Many of the articles are highly technical in nature and aimed primarily at natural-products chemists, but occasional comprehensive review articles are somewhat broad-



The dainty little Bloodroot (Sanguinaria canadensis), *so called because of the red juice that flows from the cut roots, was used by North American Indians to treat several ailments. Modern science has confirmed its value against malignant tumors.*

er in scope. Articles range from the incomprehensible to the merely obscure. Many more accessible articles on ethnobotany and medicinal plants can be found in past issues of the *Journal* when it was still published under the title *Lloydia.* As a college student in the early seventies with a more than casual interest in psychedelic plants, I was completely amazed to discover a scientific journal almost entirely devoted to articles on my favorite hallucinogens, plus a good many that even this budding psychopharmacologist had never heard of.

Fashions change, and the *Journal of Natural Products* has become a good deal more staid; but it's still useful for the serious phytochemist. Those with more esoteric agenda should take the time to browse through the contents of past issues at their nearest medical or biological library.

Lloyd Library and Museum. Don't drop in unannounced; address inquiries to The Librarian, The Lloyd Library and Museum, 917 Plum Street, Cincinnati, OH 45202. Founded by 19th-century mycologists and naturalist John Uri Lloyd and his brother, Curtis Gates Lloyd (also the original editors of the journal *Lloydia; The Journal of Natural Products,* its successor, continues as a joint publication of the Lloyd Library and the American Society of Pharmacognosy), the Lloyd Library houses one of the world's most comprehensive collections of literature on the natural sciences, with emphasis on pharmaceutical sciences, ethnomedicine, botany, mycology, and chemistry. It contains over 165,000 volumes, 100,000 pamphlets, and subscribes to more than 2,000 scientific publications related to these fields. The facilities of the Library, including a photocopy service, are available to scientists and other investigators.

The South African yam, Dioscorea elephantipes *has potential for commercial diosgenin extraction and synthesis of sex hormones. It was in Mexican yams that diosgenin was first found in sufficient quantities to make the contraceptive pill available on any scale. Before Russell E. Marker took his two kilos of yam-derived progesterone to a large Mexican pharmaceutical company in 1942, the drug had been expensive and rare. Marker's yams at once broke the existing monopoly on commercial progesterone, and gave birth to the contraceptive pill industry.*

Quinine, still the most effective antimalarial agent, comes from the Chinchon trees of the Andes. The Jesuits of Lima first introduced the ground bark to Europe. Known to the Indians as quinaquina, *"the bark of barks," quinine is obtained by stripping the bark from the trees, a process which eventually kills them. Some other alkaloids such as quinidine also have pharmaceutical applications.*

Journal of Ethnopharmacology. Available by subscription ($450/year: Ouch!) from Elsevier Scientific Publishers Ireland Ltd., P. O. Box 85, Limerick, Ireland; tel. 061/61944. An interdisciplinary journal devoted to research on indigenous drugs. Although there is no official connection, in many ways the *Journal of Ethnopharmacology* has inherited the spirit formerly to be found in the journal *Lloydia.* Articles cover a broad range of topics related to drug plants and medicines used in aboriginal and traditional medicine. Most are readily accessible to the layman and will also interest pharmacologists, botanists, chemists, physicians, anthropologists and those of similar bent. Most scientific and medical libraries at larger universities subscribe, but it's often difficult or impossible to find at smaller colleges.

Journal of Psychoactive Drugs. Subscriptions for this quarterly journal are available from Haight-Ashbury Publications, 409 Clayton Street, San Francisco, CA 94117; 415/626-2810 ($60 to individuals, $90 to institutions). A multidisciplinary forum for the study of the drug culture. This is the current incarnation of the former *Journal of Psychedelic Drugs,* originally founded in the early seventies by the Haight-Ashbury Free Medical Clinic and S.T.A.S.H. Press in Ann Arbor. The emphasis of the journal, as implied by the title change, has broadened from an exclusive (some might even say obsessive) focus on psychedelic drugs to include articles on a variety of drug-related topics ranging from the sociology of drug abuse to the current status of therapeutic interventions for chemical dependence. Quality of the included publications is somewhat uneven, ranging from the rather technical and specialized to the merely silly. It is still a useful reference for health professionals, drug counselors, therapists, drug users and abusers, law enforcement personnel, and anyone else with a personal and/or professional interest in a myriad of drug-related issues. Occasionally, the *Journal* publishes articles on hallucinogenic or psychoactive plants and thus should not be overlooked by ethnopharmacologists, ethnobotanists, and other "planty" types.

NAPRALERT — Natural Products Database. Program for Collaborative Research in the Pharmaceutical Sciences, College of Pharmacy, University of Illinois at Chicago, P. O. Box 6998, Chicago, IL 60680. Search order forms: $10 per question. An acronym for NAtural PRoducts ALERT, this database is available on a fee-for-service basis from the University of Illinois. The database specializes in providing Ethnomedical, Pharmacological, and Phytochemical profiles on extracts and compounds from plant, animal, microbial, and marine sources, scoured from more than 75,000 sources of current and past scientific literature. In addition, the service can also provide searches on biologically active species, and bibliographic surveys based on the needs of the individual customer. Unfortunately NAPRALERT is not yet available "on-line" from database vendors such as Dialog Information Services, but hopefully this will change in the foreseeable future. ■

Illustrations and captions from *Green Inheritance* (Anthony Huxley, 1985; Anchor Press/Doubleday, New York).

Seeds of Change

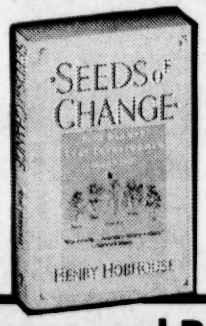
English farmer and journalist Henry Hobhouse explores five plants that have changed the course of human history:

• Quinine, the extract of a South American tree that made the European colonization of the warm tropics possible by providing a remedy against malaria.

• Sugar, the drug that brought new life to slavery, a practice discredited in the West since the fall of Rome.

• Tea, a stimulant whose profits were later used to finance a war in which England fought for the right to sell opium in China.

Seeds of Change
Henry Hobhouse, 1985; 252 pp.
$8.95 ($10.45 postpaid) from Harper & Row, Rt. 3, Box 20B, Hagerstown, MD 21740; 800/638-3030. (or Whole Earth Access).



• Cotton, a plant whose labor-intense cultivation needs nearly shattered the American Federal Union. And

• Potatoes, the Andean root crop whose failure in Ireland brought millions of Irish to the New World.

Hobhouse reminds us that plants, as commodities and as sources of drugs and food, have again and again changed the fates of peoples and nations in unexpected and far-reaching ways.

—Terence McKenna

[Suggested by Lisa O'Connell]

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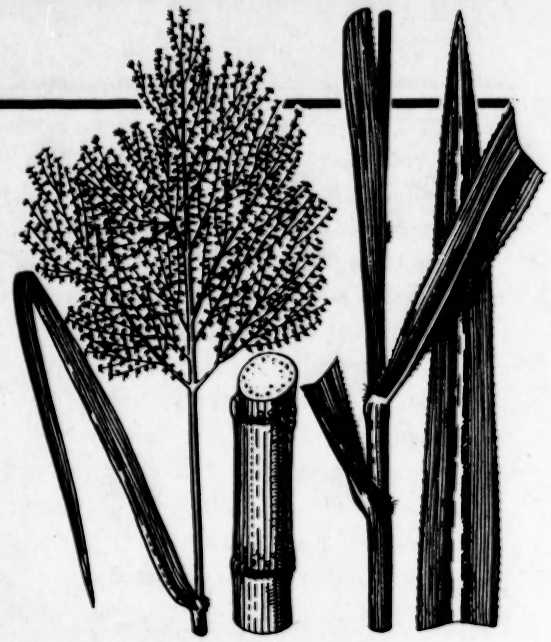
Sugar, then, is the most notable addiction in history that killed not the consumer but the producer. Every ton represented a life. Every teaspoonful represented six days of a slave's life. Put that way, would anyone in eighteenth-century England have touched sugar? But, of course, few people in the eighteenth century did put the problem quite like that. . . .

While Mediterranean slavery, both Moslem and Christian, continued up to and beyond the sixteenth century, it was of a particular nature. Slaves, like gold, jewels, works of art, and wine, were luxuries, not necessities; they were part of what we would now call "conspicuous consumption." Slaves were paraded, displayed, bought and sold, given and received as objects indicating status. Their economic function was not much greater than that of any other ornament.

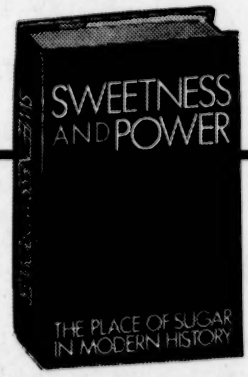


Sugar cane.

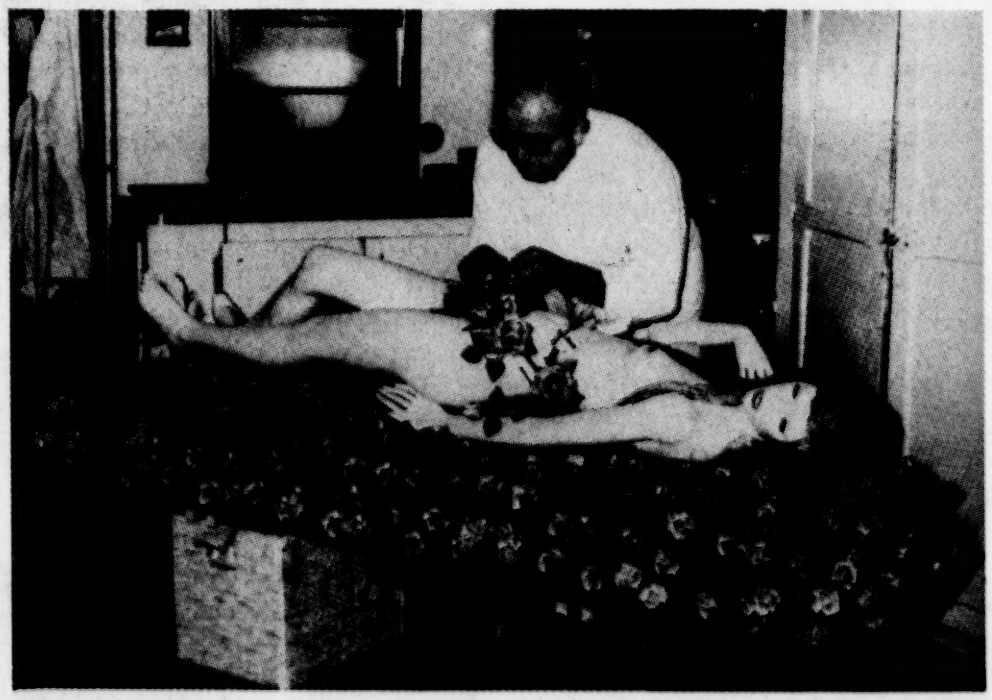
Sugar slavery was of quite a different order. It was the first time since the Roman *latifundia* that mass slavery had been used to grow a crop for trade (not subsistence) in a big way. It was also the first time in history that one race had been uniquely selected for a servile role.

Sweetness and Power

Plants have power, powers intrinsic to themselves. They shape history pushing humans into opiate sleep or sugar highs. Historians have largely ignored plants — thinking humans are somehow in control of the flora — although to produce sugar Westerners were reduced to making slaves of Africans. But every once in a while the flora rise up and humans admit that maybe they are really the weaker, dependent so completely on the life of the vegetable kingdom.



Sweetness and Power
Sidney W. Mintz, 1985; 274 pp.
$7.95 ($9.45 postpaid) from Viking-Penguin/Cash Sales, 120 Woodbine Street, Bergenfield, NJ 07621-0120; 201/387-0600 (or Whole Earth Access).



This is the first book to begin to give one plant — sugar cane — its proper due. It slips quickly through the history of honey to its cultivated substitute to its recent competition with chemically synthesized sweeteners. It traces its trickling from the upper classes into the working man's tea. Mintz seems to love the fetishism of sugar. There is a great photo of a naked woman in a bed of roses — all sugar paste.

The book is a bit cotton-candy — I would like more of the hard-commodity economics (e.g., sugar/Cuba/US/USSR or the sugar lobby and US price supports) and more on the psychology of sweet (e.g., your pupils swell with sweetness in Coca Cola taste tests). But these reservations are because I want more. What is written is the first and best of the destiny of humans in a photosynthetic circus. *—Peter Warshall*

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Before the end of the seventeenth century, while sugar was still a precious and rare substance, it had little meaning for most English people, though if they ever got to taste sugar, they doubtless thought it desirable. The rich and

Etienne Tholoniat, a great French sugar baker, puts the finishing touches on a life-size chocolate nude with spun-sugar hair. She is lying on a bed of six hundred sugar roses.

The Most Practical Thing I Learned In College

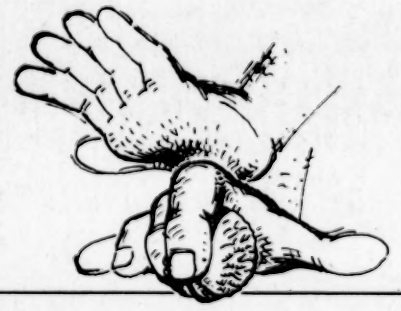
. . . came long after I'd endured 5½ years of higher education. I was enrolled in a class on fruit-tree cultivation at my local JC when the instructor casually demonstrated how to crack a walnut — barehanded. No hammer, no pliers. It's pure soft tech and it goes like this:

- Place the walnut on a hard surface with the seam up.

Curve your index finger over the seam.

- Using the palm of your other hand like a hammer, whack down on the index finger, medium hard.

The technique is definitely easier to demonstrate in person than in print, but after a few tries you'll pick it up. Avoid very small walnuts. Here's a pic to help out. —Dick Fugett



Are Your Dental Fillings Poisoning You?

This is a fairly authoritative account of the pros and cons of the "mercury toxicity" debate that often transpires between dentists and proponents of this theory. The only thing about this book that bothers me is the title . . . it's just too dramatic. Other than that, the book is very fair in its description of the possible problems. This book, unlike others on the subject, contains level-headed evaluation of both sides of the issues.
—Bernie Bildman, D.D.S.

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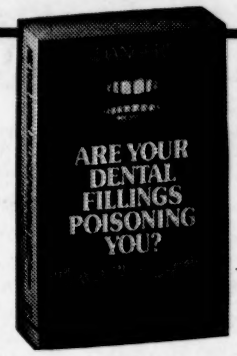
All dental materials are chemicals and, as such, have some toxic potential. Gold has the lowest toxic potential. However, gold filling materials (inlays, onlays and crowns) contain other metals which have to be evaluated because of their toxic potential.

Composites give off compounds as they wear. These organic compounds can be chemically changed in your body. This change makes it difficult to follow these compounds as they travel throughout your body. Because the new compounds are difficult to identify, it is unknown if composites are toxic. Any dental material can be toxic depending on the individual. What you must consider is the relative toxicity. A review of the literature indicates that mercury is a known toxin; the literature has not addressed the toxic potential of composites.



Are Your Dental Fillings Poisoning You?
Guy S. Fasciana, D.M.D., 1986; 224 pp.
$12.95 ($15.45 postpaid) from Keats Publishing, Inc., P. O. Box 876, New Canaan, CT 06840; 203/966-8721 (or Whole Earth Access).

People's Yellow Pages

In back of the word democracy is daimos, *a neighborhood or area of land a citizen of the Attic state was able to walk across in a day. The subdivisions of American democracy have become unwalkably large: directories like the Santa Cruz Action Network's* ***People's Yellow Pages*** *put government agencies, social service organizations and community groups back in the neighborhood.*

This fifth-edition ***PYP*** *is exemplary, updating a twenty-year-old idea with a handsome, laser-printed layout; all listings in both English and Spanish; extensive cross-referencing; a section on AIDS, including the most comprehensive brand-name evaluation of latex condoms I've seen anywhere; and quick-access phone listings of local government services from* Abandoned Vehicles *to* Zoning.

Even if you don't live anywhere near Santa Cruz, ***PYP*** *can serve as a model of empowering organization. It invites imitation. If you* are *a citizen of this* daimos, *whether you're looking for a hiking-and-support group for pregnant teens, who to call to get your sidewalk fixed, or the mailing address of the Eternal Youth Chamber Orchestra, you'll find it in* ***PYP****. Let your fingers do the walking.* —Steve Silberman

People's Yellow Pages
1988; 256 pp.
$5 ($6 postpaid) from SCAN/PYP, 320-H Cedar Street, Santa Cruz, CA 95060; 408/458-9425.

A Sample Listing

Parent Organization: Cabrillo College
Organization Name: **Stroke Center**
Address: 501 Upper Park Rd. Santa Cruz 95065
Mail Address: *Mail:* 6500 Soquel Dr., Aptos, CA 95003
English Description: Offers physical, occupational, and speech therapy classes for adults with any physical disability. Financial assistance for Cabrillo College registration fees is available. Spanish spoken. Some access for those with disabilities.
Additional Languages
Spanish Description: *Ofrece clases de terapia física, ocupacional, y del habla para adultos con cualquier incapacidad física. Hay disponible ayuda financiera para los costos de matrícula del Colegio Cabrillo. Se habla español. Acceso limitado para los individuos incapacitados.*
Phone Numbers: 425-0622 & 688-0150
Bus Routes: Bus 9
Hours: 9:20-2:10 M-Th
Additional Access

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powerful, however, derived an intense pleasure from their access to sugar — the purchase, display, consumption, and waste of sucrose in various forms — which involved social validation, affiliation, and distinction. The blending of sugar with other rare and precious spices in the preparation of food; the use of sugar as a fruit preservative; the combination of sugar with crushed pearls or fine gold in the manufacture of medical "remedies"; the magnificent subtleties giving concrete expression to temporal and spiritual power — all confirm what sugar meant, and how sugar use informed meanings, among the privileged.

•

Refined sugar . . . became a symbol of the modern and industrial. It early came to be viewed in this way, penetrating one cuisine after another, accompanying or following on "westernization" or "modernization" or "development." Sucrose turns up as a pioneering and popular sign of "progress" among Native North Americans, Eskimos, Africans, and Pacific Islanders. Commonly, people learn about it in one of two ways: either they exchange their labor or products or wages for it (along with other desired western goods); or else it is given to them as part of the charity provided by the West — charity usually donated after the westerners recognize the economic disorganization arising from their protracted contact with "less developed" traditional cultures.

More Mail Order Organic Foods

BY ANN NUGENT

IF YOU CAN'T GET TO THE MARKETS that sell organic food, try ordering by mail. Over eighty mail-order food companies offer organically grown food, but they vary widely in quality and service. Here are some more picks from Ann Nugent, who wrote "Mail Order Foods" (*WER* #62, p. 76).

—Corinne Cullen Hawkins

Blue Heron Farm. *P.O. Box 68, Rumsey, CA 95679; 916/796-3799.* All produce — organic almonds, walnuts, and oranges — is grown on this family-owned farm. It's a member of the California Certified Organic Farmers Association. Crops are handpicked and stored cold. Almonds and walnuts are ready in the fall, oranges available in February and March. Nuts are $2.75/lb. Gift packages if you wish.

Hawthorne Valley Farm. *Route 21C Harlemville/R.D. 2, Box 225A, Ghent, NY 12075; 518/672-7500.* It sells only organic cheese, bread, and granola, all of which are produced from grains or animals raised on the farm. It's primarily a school for children from nursery through high school, where they live and learn the bio-dynamic way of life, "which treats the land as a living organism." A 28-oz. loaf of bread is $2.25. You must buy either half or whole wheels of cheese (four- or five-pound minimum at about $4.25/lb.).

CHEESE:

Raclette	_____	$4.00/lb	7-14# wheel
	_____*	*$4.25/lb	4-7# half-wheel
Emmenthaler	_____	$4.20/lb	9-15# wheel
	_____	$4.50/lb	5-7# half-wheel
Gruyere	_____	$4.40/lb	10-15# wheel
	_____	$4.60/lb	5-7# half-wheel

Starr Organic Produce. *P. O. Box 561502, Miami, FL 33256-1502; 305/262-1242.* This company is limited to bulk orders and to tropical and citrus fruits (ten varieties) — like mangoes, bananas, and oranges. But it's included here because organic fruit is hard to find, and the company insists on quality control: "certification affidavits are available upon request." Its interesting brochure tells you about growing organically, and gives helpful hints about how to store your fruit. A 40-lb. box of grapefruit (available late winter and spring) is $16 plus shipping.

MANGO — available June - August ..... The mango is considered one of the finest fruits of the Tropics, with a tropical peach-like flavor. Mangos can be peeled, sliced, and frozen for a year round enjoyment. Fresh consumption is the most popular use, but this tropical delicacy can also be dried, canned, made into ice cream, or cooked in jams, jellies, preserves, pies, or chutney.	25 lbs. 40 lbs.	$20.50 30.00
AVOCADO — available August - February ..... This very versatile New World Fruit has vegetable-like oils and protein among its ingredients. Depending upon the variety, the color of the skin at maturity may be green, black, purple, or reddish. The yellow to lite-green flesh has a buttery texture with a nutty flavor.	25 lbs.	15.00

The Herb & Spice Collection. *P. O. Box 118, Dept. D28, Norway, IA 52318-0018; 319/227-7791.* This company carries only herbs, but it's included because it carries every kind imaginable, and it has an impressive 60-page catalog that is one of the best-organized of the lot. Members get discounts. Special section for certified-organic herbs. Individual items are marked organic, though the term isn't defined.

Calendula Flowers	Calendula officinalis	15035	.3 oz	$1.39	525	1 lb	$4.89
Canada Snake Root Cut	Asarum canadense	15036	1.7 oz	3.25	526	1 lb	14.95
Cape Aloes Powder	Aloe ferox	15037	2.4 oz	3.25	503	1 lb	12.95
Cascara Sagrada Bark Cut	Rhamnus purshiana	15038	1.3 oz	1.75	527	1 lb	6.25
Cascara Sagrada Bark Powder	Rhamnus	15039	1.6 oz	1.89	825	1 lb	6.49
Catnip Herb Cut	Nepeta cataria	15040	.5 oz	1.45	775	1 lb	6.50
Catnip Herb Cut (C.O.)	Nepeta cataria	15041	.5 oz	1.59	529	1 lb	8.95
Centaury Herb Cut	Centaurea centaurium	15042	.8 oz	1.79	530	1 lb	12.25
Chamomile Flowers German	Matricaria chamomilla	15043	.5 oz	1.65	531	1 lb	14.89
Chamomile Flowers Roman	Anthemis noblis	15044	.5 oz	2.25	737	1 lb	19.95
Chaparral Leaf Cut	Larrea tridentata	15045	.8 oz	1.39	532	1 lb	4.25

Paul's Grains. *2475-B 340th Street, Laurel, IA 50141; 515/476-3373.* Sells a limited supply of organic grains, flours and cereals, grown mostly on its own farm, which it has owned since 1964. It explains its organic growing methods, and says the food is also stored and processed without chemicals.

WHOLE GRAINS	PRICE PER LB. 1 to 4#	5 to 49#	50# or MORE
Corn Kernels (open pollinated)	.31	.29	.27
Wheat Berries (hard red winter)	.34	.32	.30
Rye Berries	.37	.35	.33
Edible Soybeans	.49	.47	.45
Buckwheat (unhulled)	.49	.47	.45
Oat Groats (some broken)	.66	.63	.60
Barley Groats (some broken)	.66	.63	.60
Brown Rice - Ohsawa short grain	1.15	1.08	1.03

Eagle Agricultural Products. *Route 4, Box 4B, Huntsville, AR 72740; 501/738-2203.* It defines the standards by which its crops are organically grown, standards that "are maintained throughout the production, storage, processing, harvesting and packaging of our products." Limited supplies of grains, flours, beans, cereals. Two- to five-pound minimum order. Nine varieties of organic bread: six-loaf minimum ($8).

ORGANIC HARD RED WINTER WHEAT
99976 25 lb.....(28 lb. ship wt.) $ 5.70

ORGANIC WHOLE YELLOW CORN
99972 25 lb.....(28 lb. ship wt.) $ 4.80

ORGANIC WHOLE BLUE CORN
99968 25 lb.....(28 lb. ship wt.) $ 11.10

Fiddler's Green Farm. *R.F.D. 1, Box 656, Belfast, ME 04915; 207/338-3568.* Specializes in organic pancake, muffin and bread mixes, but it also carries organic jam and organically grown coffee (about $5/12 oz.). All products are grown and prepared on the farm (except for the Guatemalan coffee). The owners explain their organic-farming philosophy.

PENOBSCOT PORRIDGE

The same delicious blend we've supplied to friends and family for years is now available to the public . . . Our own winter wheat and rye berries, together with whole corn and brown rice – all organically grown – are selectively toasted and stone ground to retain their nutty flavor and vitamin richness. Together, they produce a robust hot cereal with a unique and lively taste. 1 lb. $2.38; 5 lbs. $9.50

Morningland Dairy. *Rt. 1, Box 188B, Mountain View, MO 65548; 417/469-3817.* Though it sells only one type of food — organic, raw-milk cheeses — it rates review since organic cheese is hard to find. It produces the cheese with milk from its own herd of cows that feed only on organic crops. The helpful brochure tells you how the owners work the farm organically, and how they produce their cheeses. The farm offers fourteen varieties, primarily jack, colby and cheddar. An under-a-pound-sized cheddar is about $2.70/lb. Shipped in insulated bags.

Variety	No.		40# block
MONTEREY JACK	_____	x	$2.00
HOT PEPPER JACK	_____	x	2.05
MILD PEPPER JACK	_____	x	2.05
CARAWAY JACK	_____	x	2.05
ITALIAN JACK	_____	x	2.30

Green Earth Natural Foods. *2545 Prairie Avenue, Evanston, IL 60201; 800/322-3662.* This is a store specializing in organic foods, but it's starting a mail-order service and the catalog is now ready. It carries a full line of organic produce, bulk grains, nuts, dried fruit, and meats, and offers eight varieties of organic apples — MacIntosh at $1.25/lb. Most of the produce is certified organic, but it doesn't specify which ones.

Regular	
Cafe Altura:	
dark roast	9.99/lb
regular roast	9.38/lb
Cafe Tierra:	
medium roast	8.99/lb
viennese	8.88/lb
breakfast	8.99/lb
amaretto	9.45/lb
golden pecan	9.79/lb
swiss chocolate almond	9.45/lb

Maine Coast Sea Vegetables. *Shore Road, Franklin, ME 04634; 207/565-2907.* Its informative brochure says that its hand-picked products, which grow wild in the pure-enough Maine Coast sea, qualify for the organically grown category. Its sea vegetables are limited to alaria, kelp, nori, and dulse. Nori is $14/lb.

BULK	STOCK #	PRICE
Dulse	W01	$9.25/lb.
Alaria	W02	$6.25/lb.
Kelp/Kombu	W03	$5.60/lb.
Atlantic Nori	W04	$14.00/lb.

Gold Mine Natural Food Company. *1947 30th Street, San Diego, CA 92102. (CA) 800/647-2927; (US) 800/647-2929.* Its organically grown products are certified by California state law, and it regularly tests its other products for pesticide residues, but it doesn't say what it means by this. The catalog is worth getting for interesting news about macrobiotic cooking. Large inventory: eight varieties of cool-ground corn flour, 20 varieties of unyeasted organic breads (minimum order three loaves). A 24-oz. loaf of whole-wheat bread is $3.39. ■

BLACK AZTEC SWEET CORN
This dark-colored corn is a very old variety originally from Mexico and preserved unhybridized by the Amish. Its sweet taste requires very little additional sweetening for baking.

'WATERSHINE' BLUE FLOUR CORN
A separate genotype of Hopi Blue Corn, especially for grinding. Brilliant, deep blue in color.

REED'S YELLOW DENT CORN
A genetic cross between flint, dent and sweet corn, and therefore higher in protein than other yellow corns. Excellent for grinding into meal or flour.

KEN'S MULTICOLORED FLINT CORN
A traditional Indian corn. Makes a beautiful brown cornmeal with high nutritional value.

Mountain Ark Trading Company. *120 South East Avenue, Fayetteville, AR 72701; 800/643-8909.* Macrobiotic foods. Large inventory includes items like organic miso and ten kinds of organically grown beans. Its major drawback is that it's hard to tell if the listed items are organic or not, nor does it explain the meaning of its term "organically grown." But its catalog, which changes every two months — it's more like a newspaper — is worth getting just for its friendly, informative spirit. Organic, whole-wheat bread: 22 oz./$3.49; minimum order five loaves. $8 surcharge for airmail during summer.

Special Quality Sesame Seeds
Price reduced .25$ per lb.!
These high quality sesame seeds are an excellent source of protein, calcium, iron and vegetable oil. Mountain Ark's sesame seeds are carefully cleaned and graded, then water-washed to be free of stems and stones. Roast with salt to make Gomashio, or, grind into sesame butter for a fresh, nutty spread.

28015	1 lb.	1.75
28018	5 lb.	8.49

Mendocino Sea Vegetables. *Box 372, Navarro, CA 95463; 707/895-3741.* It says that its sea waters are pollution-free, and its wild sea vegetables match the highest standards of organically grown crops. It carries ten varieties, more than double its rival company on the opposite coast, though prices are higher (nori: $20/lb.).

PACKAGED

one-ounce packages of **Mendocino Nori**	@ $2.20 per package.
one-ounce packages of **Mendocino Wakame**	@ $2.00 per package.
one-ounce packages of **Mendocino Kombu**	@ $2.00 per package.
one-ounce packages of **Sea Palm Fronds**	@ $2.00 per package.
one-ounce packages of **North Atlantic Dulse**	@ $2.00 per package.
one-ounce packages of **Sea Whip Fronds**	@ $2.20 per package.
1.5-ounce packages of **Neptune's Delight** *(a sampler of nori, wakame and sea palm fronds)*	@ $2.50 per package.
one-ounce packages of **Flaked Nori**	@ $2.20 per package.
one-ounce packages of **Sea Lettuce**	@ $2.60 per package.
one-ounce packages of **Mendocino Grapestone**	@ $2.20 per package.

1989 Organic Wholesalers Directory & Yearbook

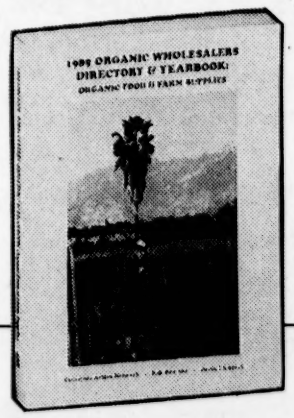
This is the best single-source access to the burgeoning organic-foods market I have seen. The movement of organic foods from alternative health-food stores into major supermarket chains is creating rapid change, which gets deft and comprehensive coverage in this directory, now in its sixth yearly edition. Most of the information here is generated by responses to questionnaires sent by the nonprofit publisher, California Action Network.

Food wholesalers — including growers, processors and manufacturers — plus sources of organic farm supplies for the U.S. and Canada are all listed and indexed. There is even a listing by a "vegetarian and avid consumer of organic products" Manhattan attorney, "providing professional services in connection with equity and debt financing."

Groups certifying organic products are listed, states with organic laws on the books have summaries of their legislation, and support groups from all across North America are described. The politics of an industry attempting to regulate itself is reflected in articles on organic certification and the documentation and verification of organic foods.

If you are only on the consuming end of the organic-food industry (or would like to be), the thing to know about this directory is that many of the farmers listed also sell via mail order. And if you are frustrated where you shop by a lack of organic products, this would be a great book to loan to your produce-department buyer. For anyone on any end of the business itself, this looks like an extremely useful book. —Richard Nilsen

1989 Organic Wholesalers Directory & Yearbook
Diana B. Friedman, Editor
1989; 150 pp.
$19.50 ($22 postpaid) from:
California Action Network, P. O. Box 464, Davis, CA 95617; 916/756-8518.



Haypoint Farm
Box 292, Sugar Island, Star Route
Sault Ste. Marie, MI 49783
(906) 632-1280

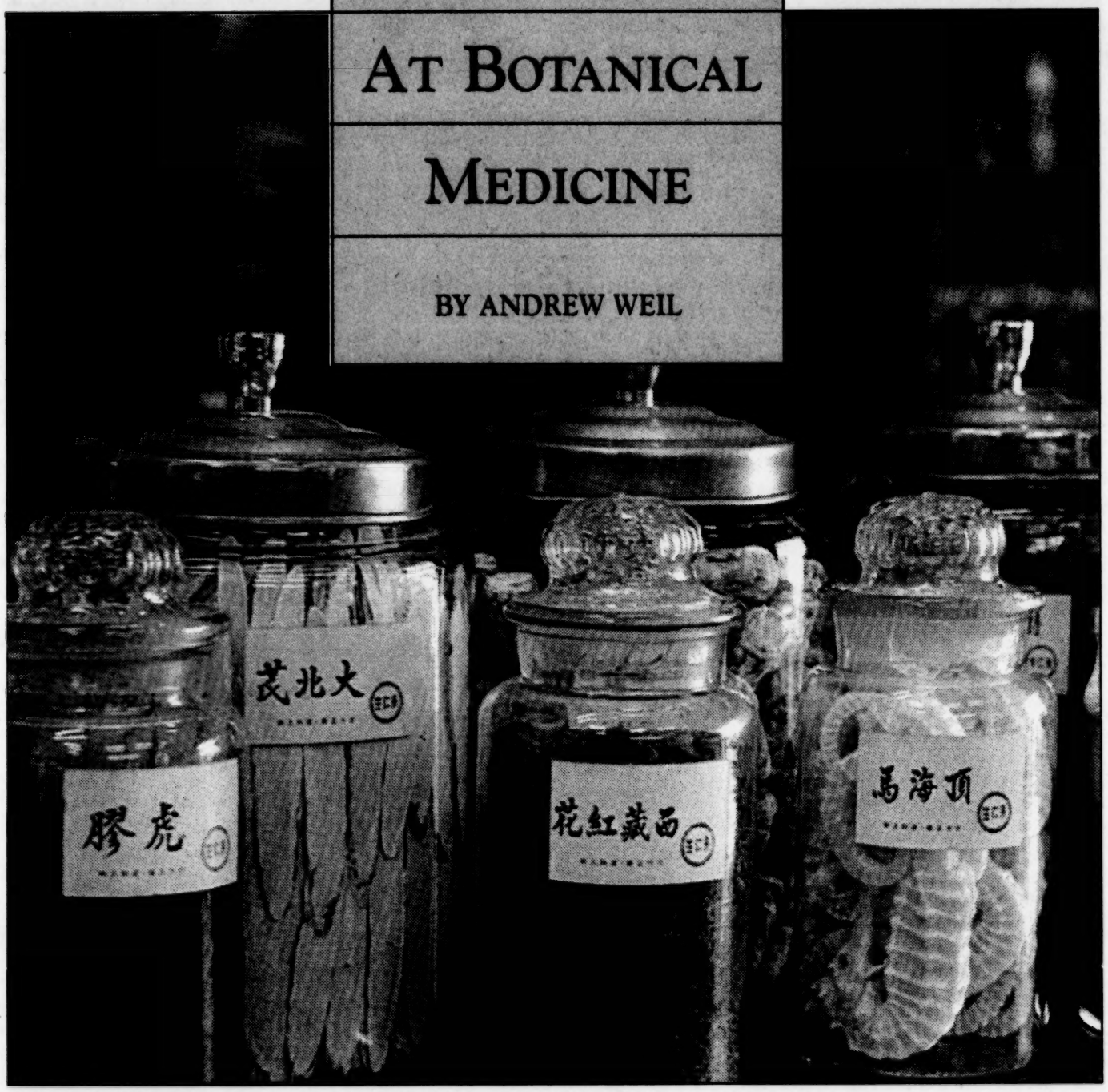
FARMER

Contact: Sue Raker
We sell organic: condiments (apple butter, cranberry catsup, pumpkin chutney, herb vinegars), fresh fruit (heirloom apples), whole grains (buckwheat, oats, barley), flours and meals (buckwheat, oat, barley —custom grinding available, <50 lbs), herbs (fresh), juices (fresh apple cider), meat (lamb), sweeteners (honey, maple syrup), fresh vegetables (lettuce). We also sell top quality hay. We prefer to sell by the case to restaurants, co-ops, etc., but frequently make exceptions. We try to tailor our deliveries to customer's specific needs.
Special requirements: We utilize Tilth and Demeter organic standards. We are licensed by the Michigan Dept. of Agriculture and offer full disclosure about our products and farming practices to any buyer or customer of our products.
Distinctive features: Haypoint Farm was homesteaded in 1920, and has always utilized organic, biologically sound farming practices. Neighboring farms have also followed these practices. Produce and products from Sugar Island demonstrate that clean air, clean water, and careful land stewardship can produce superior products.
Regions of operation: Michigan and upper Midwest, Canada (limited shipments).
Services: wholesale to retailers, mail order to general public, manufct. of organic products, farm operator.
100% of our business is organically produced. We have been in business since 1985.

Chinese Herbal Medicine

A New Look At Botanical Medicine

BY ANDREW WEIL



Dr. Andrew Weil is the author of Chocolate to Morphine *(CQ #39, p. 67), a study of human/plant interaction that was banned by the Florida legislature for its frank discussion of drug plants. Weil has long struggled to educate the public concerning the central role that plant compounds continue to play in modern medicine. Andy is both a successful writer and a practicing physician living in Tucson, Arizona.*

—Terence McKenna

BOTANY and medicine have been the closest of friends and the most distant of strangers. Two hundred years ago, anyone wishing to be a physician had to study botany, because most medical prescriptions were made from plants. Today it is unheard of for premedical students to major in botany, and interactions between the two fields are minimal. Yet drugs of plant origin still account for a respectable percentage of doctors' prescriptions, and for a number of reasons, research interest in natural pharmaceuticals is again on the upswing.

One motivation for renewing this work is the challenge of diseases for which we have no good treatments. Allopathic (regular) medicine is essentially powerless in trying to contend with viral infections, for example. It can prevent some of them (poliomyelitis, yellow fever, hepatitis) by immunization, but has no drugs to counteract them once developed. The recent epidemic of acquired immune deficiency syndrome (AIDS) points up our helplessness in this area and has greatly stimulated the search for better drugs. Other frustrating problems are Alzheimer's disease, many forms of cancer, autoimmunity, and atherosclerosis. Studies of natural products may reveal new antiviral, antitumor, immune-modulating, and anti-ageing agents, as well as materials to fill other gaps in the pharmacopeia.

Another impetus in this direction is the growing demand from patients for natural remedies, which is itself an aspect of a larger movement away from exclusive reliance on standard, allopathic treatments. Many naturopaths, chiropractors, herbalists,

and practitioners of Oriental medicine now dispense and recommend botanical products to patients who are dissatisfied with the high cost, toxicity, and inadequacy of pharmaceutical drugs. Whether we like these trends or not, it is important to realize that more people are turning to nonallopathic practitioners than ever before in this century, and that a major source of their discontent with the regular system is its exclusive reliance on synthetic drugs.

Accordingly, a strong market has developed for herbal products. I sometimes require my students at the University of Arizona College of Medicine to visit health-food stores to see the extent to which people now take medical problems there rather than to pharmacists. Retail sales of botanical remedies have increased to many millions of dollars, creating economic incentive for botanists, natural products chemists, medical researchers, and entrepreneurs to collaborate.

Normalization of relations between the United States and the People's Republic of China has further strengthened the field of medical botany. American scientists are just now beginning to appreciate the value of that nation's impressive traditional pharmacopeia, most of which is herbal. Not long ago, only a few items in it were known here, such as *Ephedra sinica*, the natural source of the bronchodilating drug ephedrine. (*Ephedra* is the oldest recorded medicinal plant; Chinese doctors knew it as *ma huang* at least five thousand years ago and recommended it for asthma and respiratory congestion).

Recent studies by Western investigators suggest that the Chinese herbal repertory contains many effective remedies. For example, the antimalarial effect of *qinghaosu*, derived from *Artemisia annua* (annual wormwood, a common weed), was confirmed in 1985 by researchers at Walter Reed Hospital and found to work by a mechanism different from any of the known antimalarial drugs.[1] Such successes have led Western pharmaceutical companies to take a serious interest in Chinese herbal medicine. Some of them have already obtained exclusive rights to develop new drugs from promising species.

Enthusiasm for this cross-cultural effort may obscure the fact that Chinese doctors and Western doctors think very differently about these plants. The Chinese prescribe them in whole form: as dried leaves, barks, or roots to be steeped and boiled in water alone or (more usually) in combination, or as concentrated liquid or solid extracts. Westerners identify "active principles" of plants, then isolate them, and prescribe them in purified form.

In Western pharmaceutical science, drugs are held in highest esteem that exert the most specific effects: the ideal drug is a "magic bullet" against a particular disease. Chinese practitioners consider drugs with specific effects in specific conditions to be inferior to drugs with general effects, useful in many conditions. Superior drugs, in their conception, are panaceas and tonics that strengthen internal resistance and bodily defenses. Ginseng is one of these superior drugs; its botanical name, Panax, comes from "panacea."

Panaceas and tonics have a bad reputation in the West. We associate them with the traveling medicine shows of a bygone era and the worthless nostrums they promoted. Many physicians and pharmacologists today regard the whole field of botanical medicine in this same light. They maintain that plants cannot have effects different from those of their purified derivatives, that prescribing whole plants is at best inexact and old-fashioned, at worst actively dangerous, that the claims made for products sold in health food stores are outrageous, that great harm is likely to result from self-medicating with them, that practitioners of herbal medicine are using "empirical" as opposed to "scientific" methods, and that medical botany has no reason-for-being in the world of modern science.

The booming business of herbs has only inflamed this controversy, creating much ill will between proponents of botanical remedies and medical professionals. Here are some recent promotional claims by herbal practitioners and manufacturers:

- *Gingko biloba* extract may be of great benefit in many cases of senility, including Alzheimer's disease.
- *Tablets containing extracts of comfrey (Symphytum officinale)* and papaya (*Carica papaya*) improve digestion.
- *Daily doses of the leaves of feverfew (Tanacetum parthenium)* prevent migraine headaches.
- *Traditional Chinese medical herbs, like Astragalus membranaceous* and the mushroom *Polyporus umbellatus*, stimulate the human immune system.

And here is a comment about some of these claims by the editor of the *Harvard Medical School Health Letter* (William Bennett, M.D., a Cambridge internist): "The use of herbs or nutrition to stimulate or strengthen the immune system is a nonsense claim . . . and to the extent that people wind up believing such claims, we

Economic Botany

Shen Nung was reputed to be an emperor of China about 3,000 B.C., and is credited with teaching people about potential uses of different herbs.

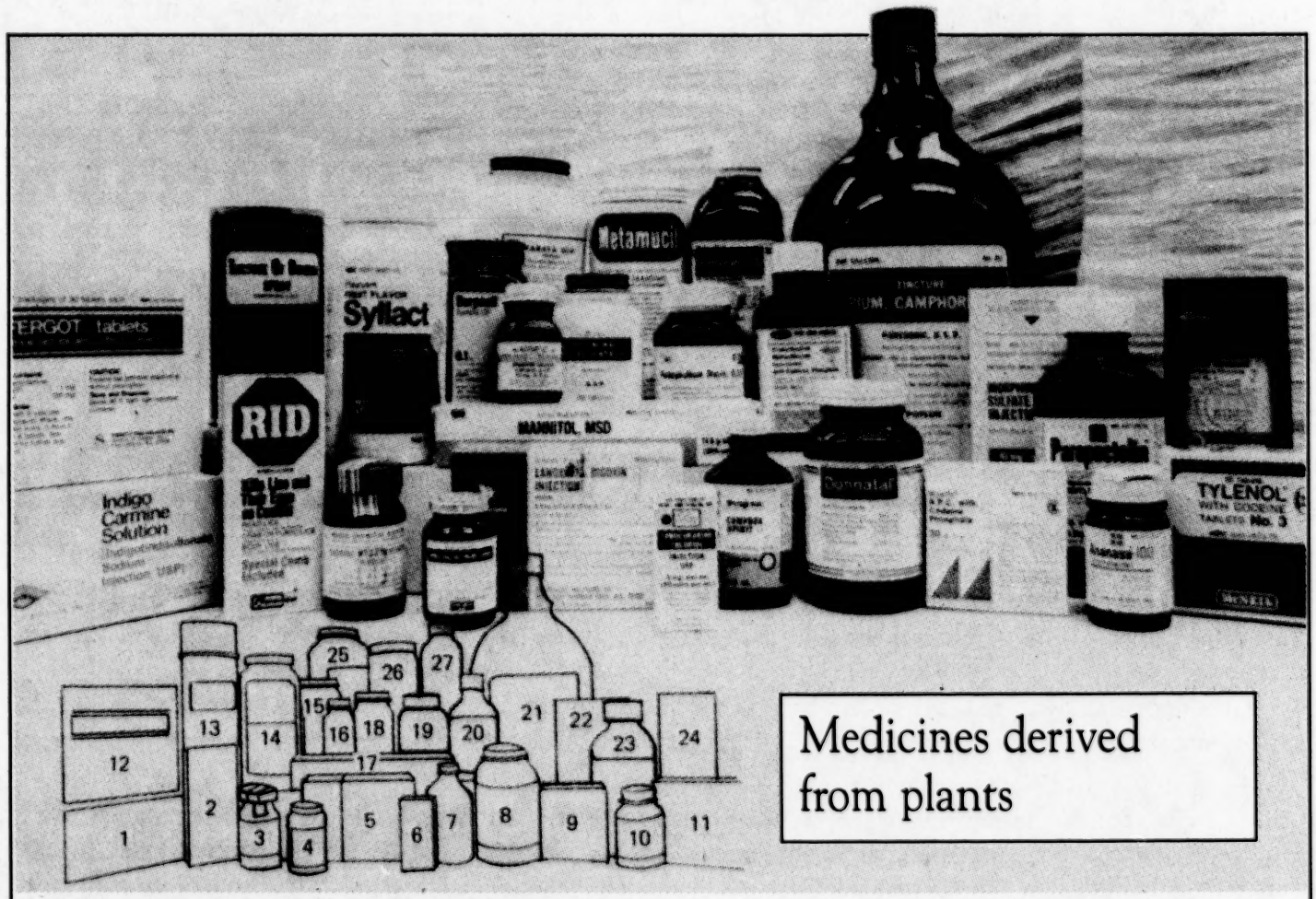
can say that their brains are damaged. . . ." (*Medical Tribune*, Oct. 13, 1988, p. 16.)

As a botanist and a physician with long experience in both studying and using medicinal plants, I would like to examine these conflicting beliefs in order to draw some meaningful conclusions about this field. To introduce the subject, let me describe the properties of a few plants that I find useful in my medical practice.

Echinacea is a genus of the Composite (daisy) family known to horticulturalists as Purple Coneflowers. The roots of two species, *E. purpurea* and *E. angustifolia*, are widely used by phytotherapists in Europe and America for their antibiotic effects, but few medical doctors today know the plants or products made from them. A native of the American plains, Echinacea was highly valued as a remedy by the Plains Indians, especially for infectious diseases. In the mid-19th century its use was taken up by physicians of the Eclectic School, an alternative medical movement favoring botanical treatments. By 1900, tincture of Echinacea had become the most popular medicine made from a native American plant, despite denunciations of it (and of eclectic practice in general) by the American Medical Association.

With the rise of the modern pharmaceutical industry in the early 20th century, plant drugs fell into disfavor, Echinacea among them. In recent years, naturopathic doctors have been its main champions, bringing it back to popularity. Once again, tincture of Echinacea is in great demand. It is available in most health-food stores and herb shops along with freeze-dried extracts of the root, encapsulated ground roots, and other products. Most practitioners and patients use Echinacea in the treatment of colds, flus, chronic and recurrent infections, and presumed states of deficient immunity.

Since 1950 there has been considerable scientific work on Echinacea, most of it in Germany, much of it verifying the properties attributed to the plant by Indians and by eclectic and naturopathic physicians. The chem-



Medicines derived from plants

Drugs from plants. Shown are many medicines currently available in pharmacies. Since many of the labels show trade names, we provide a brief summary of the botanical constituents and the uses of the drugs:

1. Indigo carmine, a histological stain from indigo.
2. RID contains pyrethrins that kill head and body lice.
3. Cocaine hydrochloride, a local anesthetic (for external use).
4. Ipecac syrup made from *Cephaelis ipecacuanha* is used to induce vomiting after poison ingestion.
5. Lanoxin contains digoxin, a foxglove cardiac glycoside that helps to stabilize heart rhythms.
6. Tubocurarine chloride contains curare from *Strychnos* species. It is used as a skeletal muscle relaxant in surgery.
7. Camphor spirits are made from *Cinnamomum camphor* and are used externally as a topical anesthetic.
8. Donnatal contains belladonna alkaloids and barbiturates which relieve cramps and spasms of the stomach, bladder, and intestines.
9. A.P.C., or aspirin with codeine phosphate and caffeine, is prescribed as an analgesic and anti-inflammatory agent.
10. Ananase 100 contains bromelain, a proteolytic enzyme from pineapple used to reduce edema, ease pain, and accelerate tissue repair.
11. Tylenol with codeine is taken for extra pain relief.
12. Cafergot tablets contain ergotamine tartrate (obtained from the fungus ergot) and caffeine. The tablets are used to treat migraine headaches.
13. Tincture of benzoin spray is an example of a plant product used as a topical protectorant.
14. Syllact is one of several brands of laxative that contain psyllium (see no. 26).
15. Serpasil is a trade name of a drug that includes *Rauwolfia* alkaloids that are effective in treating high blood pressure and emotional conditions.
16. Ephedrine sulfate is used as a bronchodilator.
17. Mannitol extracted from the dried exudate of the ash, *Fraxinus ornus* (Oleaceae), is used as a laxative.
18. Quinine sulfate is an antimalarial drug.
19. Mayapple yields podophyllin, which prevents cell proliferation in tumorous growths.
20. Promethazine hydrochloride with codeine phosphate forms the basis of some cough syrups or antihistamines.
21. Tincture of opium has been used to alleviate menstrual cramps, for diarrhea, and in other ailments that lead to painful abdominal spasms.
22. Morphine sulfate is an injectable pain killer that is used only in extreme cases.
23. Parapectolin contains opium extracts and kaolin (clay) to absorb irritants and provide relief in cases of simple diarrhea and colicky cramps.
24. Empirin with codeine phosphate provides stronger relief than aspirin alone.
25. Karaya gum (Chapter 11) is used as a bulk laxative.
26. Metamucil contains psyllium extracted from plantain seed husks. This product acts like Syllact (see no. 14).
27. Donnagel-PG contains hyoscyamine sulfate, hyoscyamine hydrobromide, and powdered opium. It is prescribed in cases of diarrhea, gastritis, colitis, and nausea.

(Photo taken with the help of Dr. James Delucio, Department of Pharmacy, University of Texas.)

Economic Botany

istry of Echinacea root is rich and complex. Several fractions show antibiotic activity and inhibition of hyaluronidase, an enzyme associated with infectious agents that weakens connective tissue.[2] Echinacea extracts also have antiinflammatory properties and an interferon-like effect that protects cells against influenza and herpes viruses.[3] Even more interesting is the discovery of two high-molecular-weight polysaccharide compounds that enhance phagocytosis and activate macrophages;[4] these are clear immunostimulatory effects.

If a piece of Echinacea root is held in the mouth, a sensation of tingling and numbing will develop gradually, becoming quite intense. Echinacea products lacking this property are likely devoid of therapeutic effect as well. The toxicity of this plant is low. Occasional users experience gastrointestinal disturbances, but adverse reactions of all kinds are infrequent.

Another medicinal plant much better known in Germany than in the United States is milk thistle, *Silybum marianum*. A European species, widely naturalized in North America and throughout the world, this robust and heavily spined thistle is a noxious weed for gardeners on the California coast. Its seeds are most valuable, however, having effects on liver cells not duplicated by any pharmaceutical drugs.

Use of milk thistle in liver disorders is a tradition in European folk medicine. In the past 15 years German investigators have identified a complex of active compounds in the seeds, which they have named "silymarin." These compounds are of a chemical class called flavonoids, very common plant pigments often showing bioactivity in animals. The components of silymarin are unusual variants of flavonoids ("flavanolignins"), possibly representing a new class of bioactive molecules.[5]

When milk-thistle seeds or extracts are ingested, silymarin concentrates in the liver, is excreted in bile, then reabsorbed through the portal vein to the liver, a process known as enterohepatic recirculation. In the liver, these compounds stimulate protein synthesis by increasing activity of ribosomal RNA. By this mechanism they appear to protect liver cells from toxic injury and boost their regenerative capacity.[6]

In a dramatic experiment demonstrating these effects, injected silymarin has been shown to protect rats from one of the most powerful liver toxins known: alpha-amanitin, the lethal principle of the death cup mushroom, *Amanita phalloides*. Administered before the toxin, it prevents liver damage; given up to 24 hours after the toxin, it greatly reduces mortality and the amount of liver damage.[7] Although silymarin has been used in Europe to treat some victims of deadly Amanita poisoning with good results, U.S. doctors and poison control centers remain unaware of it.

Modern allopathic medicine has no treatments for chronic hepatitis and alcoholic cirrhosis, two very serious liver disorders. Milk-thistle extracts appear to be useful in these conditions, and, since they have no significant toxicity, should certainly be tried. Products made from *Silybum marianum* are widely sold and used in Europe and have recently become available on the American market.

Anyone who has ever brushed against a stinging nettle (*Urtica dioica*) will not forget that plant. It is covered with stinging hairs that inject formic acid, histamine, acetylcholine, and serotonin under the skin, causing a spectacular reaction. Wild-food enthusiasts and herbalists have long held nettles in high esteem, recommending them for a pleasant tea, cooked greens, and a natural source of iron and other minerals. You gather the leaves with gloves on; once dried or cooked, they lose their sting.

In 1985 an accidental discovery of an antiallergic effect of Urtica opened new markets for this common plant. Researchers at the National College of Naturopathic Medicine prepared freeze-dried nettles and noted that they retained their stinging ability. The point of this work was to compare the chemistry and properties of air-dried versus freeze-dried botanicals. One of the investigators, a hay-fever sufferer, swallowed some capsules of powdered, freeze-dried nettles and experienced rapid relief of her hay fever symptoms.

Since then, a great many victims of seasonal pollen allergy have found to their delight that this harmless remedy enables them to do away with antihistamines, drugs with significant toxicity and such undesirable side effects as sedation, depression, and interference with mental activity. The ability of freeze-dried Urtica to diminish hay fever symptoms has since been confirmed in one controlled clinical trial.[8]

This discovery was pure serendipity and an example of empirical medicine at its best. A chance observation of an unexpected effect of a well-known plant prompted uncontrolled clinical trials and, eventually, a controlled experiment. As a result a new and useful product, both safe and effective, has become available.

I have described these three plants for several reasons. I offer them as examples of the usefulness of botanical remedies not known to most doctors and patients in this country. They suggest the range of bioactivity available in plants: who knows how many other unusual compounds and properties are out there waiting to be noticed? American readers should be aware that other countries are ahead of us in the investigation and use of medicinal plants. I hope they will also consider that folk wisdom, anecdote, and empirical method have their place in medicine, sometimes providing us with ideas that hold up under scientific scrutiny.

What of the concerns of some medical scientists about the dangers of botanical remedies? Obviously, some plants are toxic, and, less obviously, some of these have found their way into folk usage. One to know about is comfrey, *Symphytum officinale*, a Eurasian native of the Borage family, widely grown in this country. "Symphytum" comes from Greek roots meaning "to knit together," and the specific epithet "officinale" suggests the status of this species in European herbal

medicine. Comfrey has a long history of use by human beings and enjoys a strong reputation as a healing plant, one that helps wounds heal, broken bones mend, and respiratory and digestive functions to improve.

I have met many people who attribute miraculous virtues to comfrey. They make "green drinks" of comfrey leaves, eat bowls full of the leaves as salads, or take concentrated extracts of leaves and roots, sometimes mixed with extracts of papaya or digestive enzymes. I have read books and pamphlets from health food stores touting the health benefits of comfrey. Some say it is the only vegetarian source of vitamin B-12. It is not. All say that it is perfectly safe. It is not.

Research in the past decade shows unequivocally that comfrey contains pyrrolizidine alkaloids, compounds widely distributed in plants, known to be toxic, and often causing sickness and death in grazing livestock. These chemicals are particularly dangerous to the liver, where they can cause a distinctive and potentially fatal reaction (veno-occlusive disease, Budd-Chiari syndrome) in which the hepatic veins become blocked as a result of chemical injury.[9]

Comfrey *(Symphytum officinale)*

New Age Herbalist

Outbreaks of pyrrolizidine alkaloid poisoning in humans are usually the result of accidental contamination of grains with toxic seeds of other plants, but some cases are on record of individuals, especially children, who succumbed to acute liver failure after drinking various herbal teas. For example, a Mexican-American infant in Arizona died in 1977 after being given a folk remedy for sore throat; the tea, purchased at a pharmacy that carried herbal remedies, turned out to be mislabeled. Instead of a harmless species of *Gnaphalium* (cudweed), the package contained an unrelated species of *Senecio*, a desert plant with high content of pyrrolizidine alkaloids.

The alkaloid content of comfrey roots is higher than that of its leaves, and some commercial preparations of the plant have enough of these compounds to be harmful. One brand of comfrey-pepsin capsules (a "digestive aid" made from Symphytum roots) will easily deliver enough pyrrolizidines to damage the liver of anyone who takes two tablets per meal over several months.[10] Even if catastrophic liver disease does not occur, other possible consequences of long-term comfrey use include the gradual development of cirrhosis, liver cancer, and damage to lungs and other organs.

Comfrey lovers are often resistant to these warnings, believing them to be establishment propaganda against an innocent herb. Scientists interested in making people aware of the danger do not help their cause when they go well beyond their data to condemn all herbal teas. In fact, the chance of poisoning from comfrey tea, leaves, and juice is probably small, both because the alkaloid content of these forms is usually low, and because the particular alkaloids in comfrey may be less toxic and less easily absorbed from the gut than related compounds in Senecio and other species. Still, given the known toxicity of this family of alkaloids, it is hard to see why anyone would eat comfrey.

Topical application of the plant is another matter, as it does, indeed, have excellent wound-healing properties. (Systemic absorption of alkaloids by this route is minimal.) Poultices of comfrey leaves and roots figure prominently in European folk medicine, especially to treat sores that refuse to heal. I have found these treatments to be effective in cases of diabetic ulcers and stasis ulcers (bedsores) and ulcerated bites of the brown recluse spider, lesions that are notoriously long-lasting and resistant to drug treatment. I have also seen them stimulate healing of staphylococcus-infected wounds that surfers contract on tropical beaches; often, these are also resistant to conventional therapy.

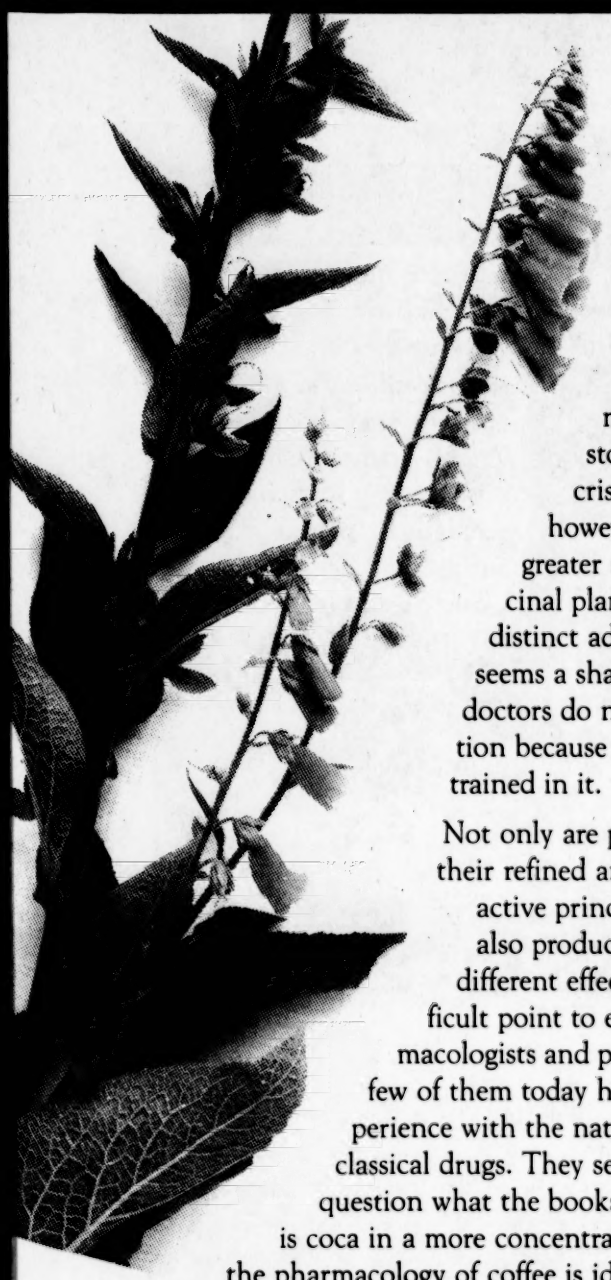
The lessons I draw from the all the information I have reviewed on comfrey are: 1) medicinal plants cannot be considered safe just because they have a long record of use in folk medicine; 2) chemical analysis of popular medicinal plants is always worthwhile; 3) the mere presence of toxins in a plant may not mean that occasional use of dilute preparations of it is harmful; 4) it is important to try to inform users about the real hazards of plant products in ways that will not cause them to stop listening.

In my own private practice of general medicine in Tucson, I have come to rely on plants as mainstays of treatment. For every prescription I now write for a pharmaceutical drug, I give out 40 or 50 for botanical remedies. In the five years that I have been prescribing in that manner, I have not produced a single adverse reaction. I do not know any physician who uses pharmaceutical products exclusively who can match that record of safety.

If one avoids plants that are probably or possibly toxic, this kind of medicine is relatively safe for the simple reason that plants are naturally dilute forms of drugs. Coca leaves, the source of cocaine, contain only one-half of one percent of that notorious alkaloid. One reason coca-chewing Indians of Peru and Bolivia have few of the problems of toxicity, abuse, and addiction that we do is that they ingest a dilute preparation of cocaine rather than inhale, smoke, or inject a concentrated one.

Because plants supply bioactive compounds in low concentration by an indirect route to the bloodstream and target organs, their effects are usually slower in onset and less dramatic than those of purified drugs administered by more direct routes. Doctors and patients accustomed to the rapid, intense effects of synthetic medicines may become impatient with botanicals for this reason.

Of course, many medical emergencies demand rapid, intense pharmacological intervention, and for these



Foxglove
(Digitalis purpurea)

crises the modern pharmacopeia is well stocked. In non-crisis situations, however, the much greater safety of medicinal plants may be a distinct advantage, and it seems a shame that most doctors do not have this option because they are untrained in it.

Not only are plants safer than their refined and concentrated active principles, they may also produce qualitiatively different effects. This is a difficult point to explain to pharmacologists and physicians, because few of them today have first-hand experience with the natural sources of classical drugs. They see no reason to question what the books say: that cocaine is coca in a more concentrated form, that the pharmacology of coffee is identical to the pharmacology of caffeine, that all of the virtues of Digitalis leaf are embodied in purified digoxin, a more conveniently administered form.

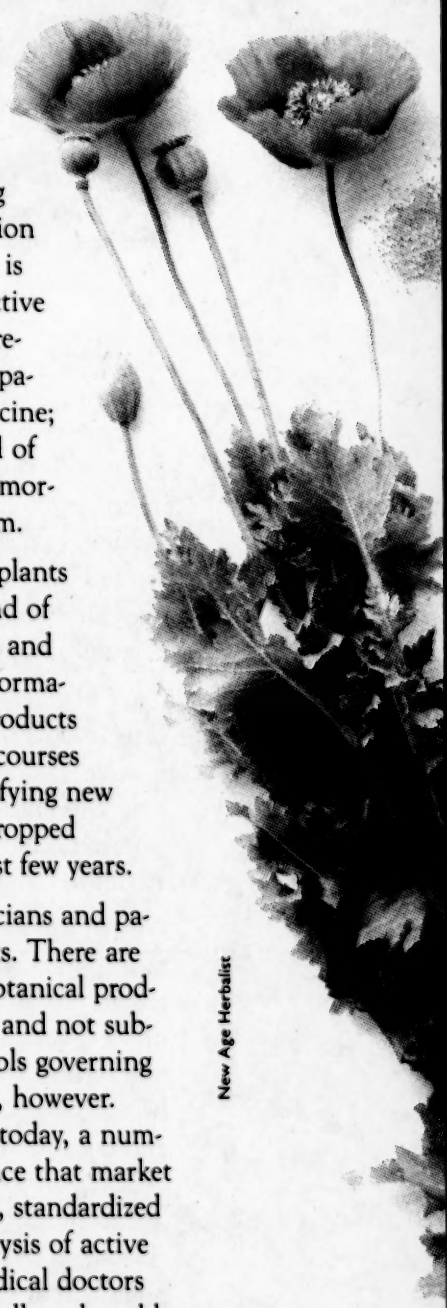
In fact, the properties of coca leaf, especially therapeutic properties attributed to it in Andean folk medicine, are not reproduced by isolated cocaine; the leaf contains thirteen other alkaloids plus vitamins, minerals, and essential oils. The other constituents modify the actions of cocaine and contribute effects of their own.[11] Coffee is more powerful, more addictive, and more irritating to several systems of the body than an equivalent dose of caffeine, either in pure form or as teas made from such other plants as yerba mate (*Ilex paraguaiensis*) and guarana (*Paullinia cupana*). It contains an oil-soluble fraction of active compounds about which we know little. One of them, chlorogenic acid, is the main stomach irritant in coffee. It is present in decaffeinated coffee, which is not pharmacologically inert, as most users believe.

Similarly, the components of foxglove (Digitalis) leaf that cause nausea and vomiting in overdose are distinct from the cardiotonic (heart-stimulating) components.[12] Purified digoxin, a most useful drug for correcting abnormal heart function, has a very narrow margin of safety; in overdose, it produces dangerous arrhythmias without the early warning signals of nausea and vomiting. Few American physicians would know how to use Digitalis leaf if it were available to them. We have lost the option of using the slower-acting but safer form of this plant with its complex chemistry.

I must stress my belief, based both on my research as a botanist/physician and on my experience as a practitioner, that whole plants have different effects from those of isolated active principles, that the beneficial effects of botanical remedies are likely to represent synergistic and holistic interactions of all the active components: secondary compounds along with the dominant principles.

Resistance to this idea is understandable, because for well over a century, teaching in pharmacology has equated the activity of plants and their purified derivatives. The historical origin of this point of view was the isolation of morphine from opium by a German pharmacist in 1803. That event marked the beginning of modern pharmaceutical science because it was the first identification of a major drug from a medicinal plant. It promised a new era of therapeutics in which doctors would be able to administer exact doses of known compounds, thus ending the inexactness, confusion, and superstition of old-fashioned herbalism. Of course, it is one thing to identify morphine as the active principle of opium, make it available to researchers, and provide it to doctors and patients as a powerful (and dangerous) medicine; it is another to believe and teach that all of the properties of opium are embodied in morphine, albeit in a more concentrated form.

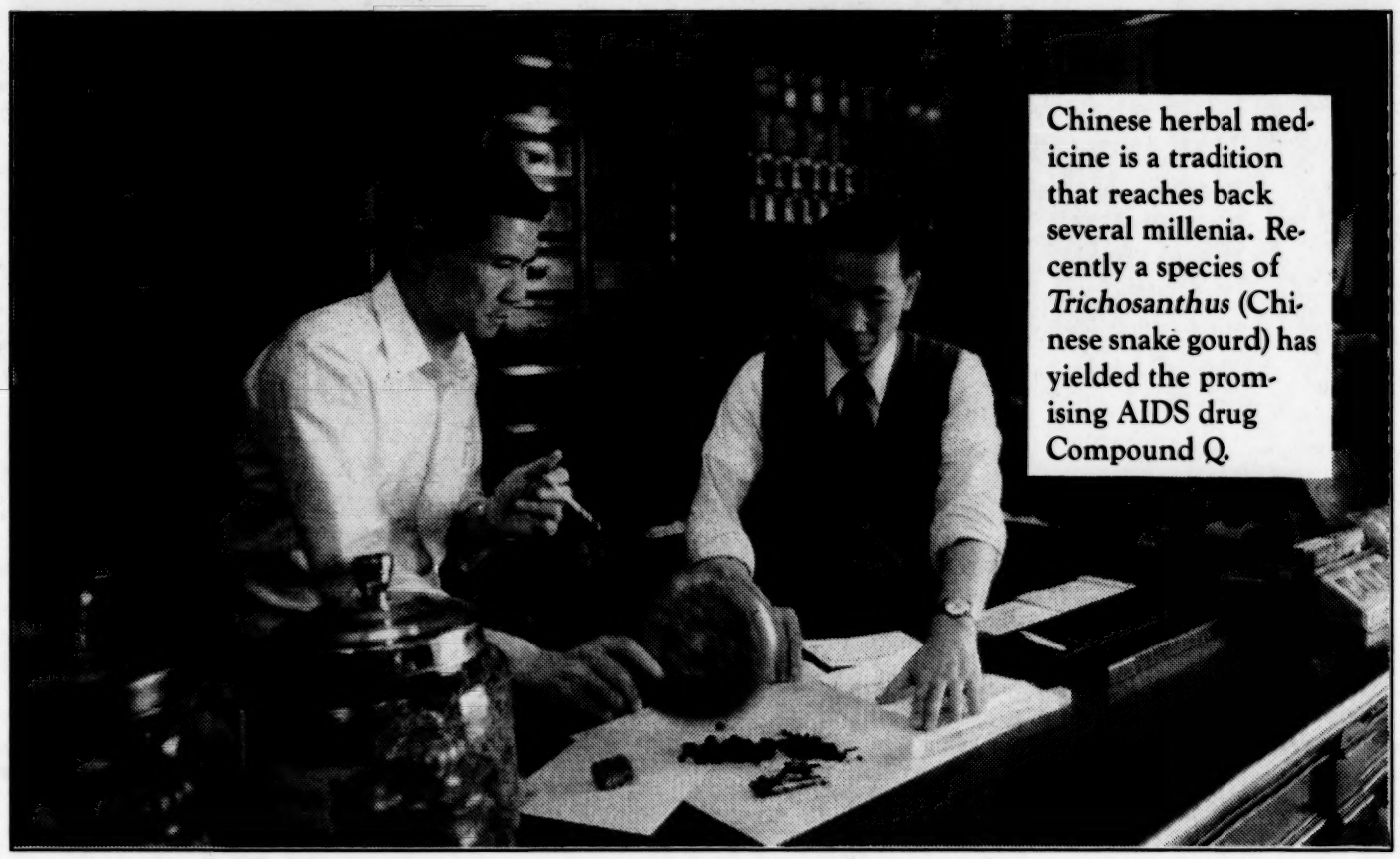
Opium poppy
(Papaver somniferum)



Only good information about medicinal plants and their derivatives can correct this kind of error, but American schools of medicine and pharmacy now pay little attention to information from the fields of botany, natural-products chemistry, and pharmacognosy. In fact, courses on pharmacognosy (the science of identifying new drugs from natural sources) have been dropped from the pharmacy curriculum in the past few years.

Many practical problems confront physicians and patients wishing to try out medicinal plants. There are few good books on the subject. Many botanical products may be unstandardized, ineffective, and not subject to the regulations and quality controls governing pharmaceutical drugs. (There is progress, however. Given the demand for reliable products today, a number of companies have come into existence that market high-quality extracts of medicinal plants, standardized for activity in terms of quantitative analysis of active fractions or by bioassay in animals.) Medical doctors who prescribe plants may feel professionally vulnerable in practicing outside accepted standards of their peers. Medical insurance will cover costs of pharmaceutical drugs but not of most herbal medicines.

As bothersome as these problems are, they are insignificant compared to the conceptual problems that are holding American medicine back in this area. For many years we allowed our stands of native ginseng (*Panax quinquefolium*) to be overharvested to the brink



Chinese herbal medicine is a tradition that reaches back several millenia. Recently a species of *Trichosanthus* (Chinese snake gourd) has yielded the promising AIDS drug Compound Q.

Chinese Herbal Medicine

of extinction for export to the Orient. During that time, our medical scientists ignored ginseng, dismissed Chinese claims of its many effects as superstition, and did not consider looking at the chemistry and pharmacology of the root. A panacea said to increase resistance to stress, improve skin and muscle tone, increase libido, and retard ageing must be a placebo, after all, because it does not fit the Western conception of a drug.

Only in recent years have researchers looked into the constituents of American ginseng and its Oriental relative, *P. ginseng*. The roots of both species are full of bioactive glycosides that affect the pituitary-adrenal axis, a mechanism that can explain all of the properties attributed to Panax in traditional Chinese medicine.

One of the most promising areas of research in botanical medicine at the moment is the search for safe enhancers of immune function. Many of the tonics in the Chinese herbal pharmacopeia are of interest, but, again, American medical science has ignored them because it does not recognize the concept of a tonic and because the plants are devoid of compounds that look like drugs in the Western sense. Most plant drugs are alkaloids (nitrogen-containing compounds that give alkaline reactions in solution) or glycosides (compounds that yield one or more sugars upon hydrolysis). The Chinese tonic plants that may be immunopotentiators do not owe their effects to alkaloids or glycosides. Instead they contain high-molecular-weight polysaccharides, long-chain sugar molecules that are structural components of the cells of many organisms and have never been of much interest to pharmacognocists.

Huang qi, a traditional Chinese remedy made from the root of *Astragalus membraceous*, is one of the most popular of these polysaccharide-containing plants. All pharmacies in China carry Astragalus preparations; they are widely used to treat and prevent colds and flus and promote the "defensive energy" of the body. Recent animal research in both China and the West has shown that polysaccharides from Astragalus root reverse immunosuppression caused by administration of corticosteroids and other immunosuppressive drugs.[13] (Astragalus, by the way, is a large genus in the pea family. The leaves of some species are toxic to livestock; they are known as "locoweed" in the American West. We know nothing about the chemistry of the roots of these and other American species of Astragalus. Some may have the same useful effect as *A. membranaceous*).

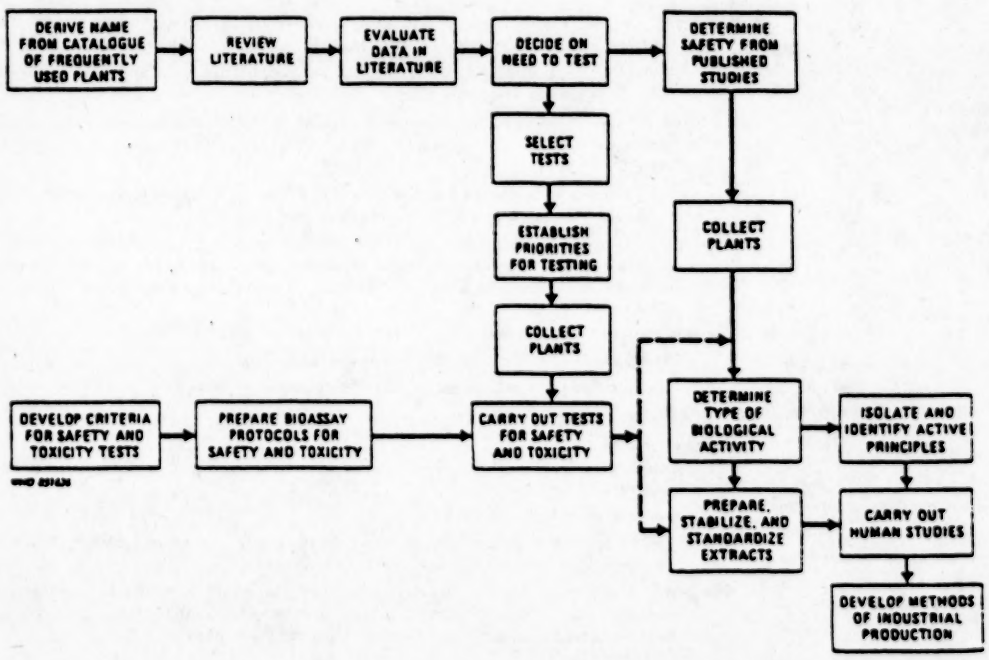
Another valued remedy in traditional Chinese medicine is *zhu ling*, obtained from the underground tuberlike growths (sclerotia) of an edible mushroom, *Polyporus umbellatus*. Western medicine has never looked to mushrooms as sources of new drugs, but in China and Japan mushrooms are prized for their therapeutic effects as much as for food. Chinese researchers have demonstrated anticancer effects of water extracts of *P. umbellatus* in both animals and humans.[14] These are not cytotoxic effects: there is no inhibition of tumor growth in vitro, only in intact animals with intact immune systems. The mushroom is nontoxic and, again, is full of large polysaccharide molecules.

Recall that Echinacea root also stimulates immunity and contains polysaccharides. One possibility is that these compounds are chemically similar to antigenic components of bacterial cell walls. Perhaps they stimulate immune responses for that reason. In any case there appear to be species of plants and fungi that are safe and effective at increasing our resistance to infec-

tions and cancer. The main obstacle to our taking advantage of these in the West is conceptual. We must be open to the possibility of new kinds of medicines that do not fit present models of drug action.

A surprising amount of information is in print on the effects of botanical medicines, much of it published very recently, most of it unread by American medical doctors. Included in this material are some well-designed, controlled studies verifying empirical and folk-medical attributes of plant remedies. For example, concentrated extracts of the leaves of *Gingko biloba*, the Chinese tree that lines many city streets throughout the world, do, indeed, increase cerebral blood flow[15] (though I know of no good evidence that they help victims of Alzheimer's disease). Daily doses of the leaves of *Tanacetum parthenium* (feverfew, a common ornamental) do, indeed, reduce the frequency of migraine attacks in some patients, and they have none of the considerable toxicity of pharmaceutical drugs used for this condition.[16]

Western pharmacology, medicine, and pharmaceutical science have accomplished so much. They could do so much more by looking again to botanical origins. I believe American medicine, in particular, could increase its record of safety and effectiveness while better satisfying the needs of patients by reclaiming the option of using plant remedies along with synthetic drugs. For that reason I hope that in this country botany and medicine will renew acquaintances and again, eventually, become friends. ■



From concept to marketplace, this flow chart details the many stages that together constitute a plant compound's journey to a place of importance in the lives of ordinary people.

Farnsworth

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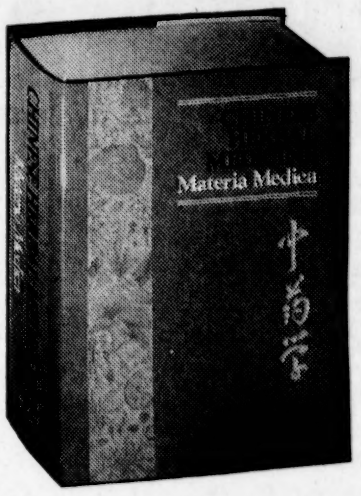
Chinese Herbal Medicine: Materia Medica

This book bills itself as "the most comprehensive book on the subject in the English language." Weighing in at over five pounds, it is not one to take backpacking. In a spacious 8½" x 11" format, it describes over 400 of the most commonly used Chinese medicinal substances. In addition to text, each entry includes a botanical-quality illustration and the item's pharmaceutical, botanical, Mandarin, Japanese, Korean and English names. For serious students of oriental medicine this is definitely a book to own, and also one that belongs on your library's reference shelf.

—Richard Nilsen

Chinese Herbal Medicine
(Materia Medica)
Dan Bensky and Andrew Gamble
1986; 723 pp.

$60 ($64 postpaid) from:
Eastland Press, 611 Post Avenue/
Suite 3, Seattle, WA 98104;
206/587-6012



干姜

Pharmaceutical name: Rhizoma Zingiberis Officinalis
Botanical name: *Zingiber officinale* Rosc.
Mandarin: *Gān Jiang*
Japanese: *Kankyō*
Korean: *Kŏngang*
English: Dried Ginger Rhizome

Properties: acrid, hot
Channels entered: Spleen, Stomach, Lung, Kidney
Text in which first appeared: *Divine Husbandman's Classic of the Materia Medica*
Functions and clinical use:

- Warms the Middle and expels Cold: used to warm the Spleen and Stomach, especially in Deficiency Cold patterns with such manifestations as pallor, poor appetite, cold limbs, vomiting, diarrhea, cold painful abdomen and chest, a deep, slow pulse, and a pale tongue with a moist, white coating.
- Rescues devastated Yang and expels Interior Cold: used in patterns of devastated or Deficient Yang with such signs as a very weak pulse and cold limbs.
- Warms the Lungs and transforms Phlegm: used in Cold Lung patterns with expectoration of thin, watery, or white sputum.
- Warms the Channels and stops bleeding: used for Deficiency Cold patterns that may present with hemorrhages of various types, especially uterine bleeding. This herb is used in hemorrhage *only* if the bleeding is chronic and pale in color, and is accompanied by cold limbs, ashen white face, and a soggy, thin pulse.

Major combinations:

- With Radix Glycyrrhizae Uralensis (*Gan Cao*) for epigastric pain and vomiting due to Cold Deficient Stomach and Spleen.
- With Rhizoma Alpiniae Officinari (*Gao Liang Jiang*) for abdominal pain and vomiting due to Cold Stomach.
- With Rhizoma Pinelliae Ternate (*Ban Xia*) for vomiting due to Cold induced Congested Fluids. Add Radix Ginseng (*Ren Shen*) for vomiting due to Deficiency Cold.
- With Rhizoma Coptidis (*Huang Lian*) for epigastric pain and distension, dysentery-like disorders, and Indeterminate Gnawing Hunger. The latter is a syndrome characterized by a feeling of hunger, vague abdominal pain or discomfort sometimes accompanied by belching, distension, and nausea which gradually culminates in pain.
- With Cortex Magnoliae Officinalis (*Hou Po*) for epigastric distension and pain due to Cold induced Congealed Fluids.
- With Rhizoma Atractylodis Macrocephalae (*Bai Zhu*) for Deficient Spleen diarrhea. If both herbs are charred, they can be used for bloody stool and excessive uterine hemorrhage.
- With Fructus Schisandrae Chinensis (*Wu Wei Zi*) for coughing and wheezing from Cold Congested Fluids preventing the normal descent of Lung Qi.

Remarks: Compared to Rhizoma Zingiberis Officinalis Recens (*Sheng Jiang*), Rhizoma Zingiberis Officinalis (*Gan Jiang*) is more effective in warming the Middle Burner and expelling Interior Cold, while Rhizoma Zingiberis Officinalis Recens (*Sheng Jiang*) promotes sweating and disperses Exterior Cold.

Cautions and contraindications:

- Contraindicated in Deficient Yin patterns with Heat signs.
- Contraindicated in reckless marauding of Hot Blood.
- Use cautiously during pregnancy.

Dosage: 1-4 qian

Major known ingredients: zingiberene, phellandrene, camphene, shogaol, gingerol, zingiberone, borneol, zingiberol, citral

Pharmacological and clinical research:

- Central nervous system effect: by acting on the central sympathetic centers, Rhizoma Zingiberis Officinalis (*Gan Jiang*) raises blood pressure.

Addendum: Quick-fried Rhizoma Zingiberis Officinalis (*Pao Jiang*) is used for hemorrhage and pain, especially when due to Deficient Yang. Some sources say that it is more effective for lower abdominal problems than Rhizoma Zingiberis Officinalis (*Gan Jiang*).

Planetary Herbology

Michael Tierra has written the first comprehensive book that integrates the traditions of Western, Chinese and Ayurvedic (Hindu) herbalism. ***Planetary Herbology*** *includes a lot of information: Eastern classifications of foods and herbs, the foundation of Western/native herbalism, details on processing and preparation, eight methods of herbal therapy, diseases and their treatment, and herbal formulas for many common and serious conditions. A planetary* materia medica *describes the most important Western and Eastern herbs, including each plant's energetics, the meridians and organs of the body it affects, plus active constituents, properties, contraindications, uses and specific dosages. As an herbalist, I've been using more and more herb books as resources. Tierra's is the one I consult most often.*

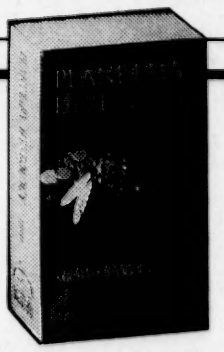
—Becca Harber

Formula 21: to aid fasting, neutralize acids and alleviate hunger

Dandelion root (chief herb)
Violet leaves (chief herb
Black pepper (chief, assistant and conducting)
Cleavers (assisting)
Fennel seed (conducting)
Cardamon seed (conducting)

Drink this formula during fasting to help alleviate hunger pangs, promote detoxification, neutralize stomach acids and help dissolve fat.

Dosage: Steep one to two teaspoons in a cup of boiled warm water. Honey may be added. Take as often as desired.



Planetary Herbology
Michael Tierra, 1988; 484 pp.

$16.95 ($18.95 postpaid) from:
Lotus Light Publications, P. O. Box 2,
Wilmot, WI 53192; 414/862-2395
(or Whole Earth Access).

Chinese Herbal Patent Medicine

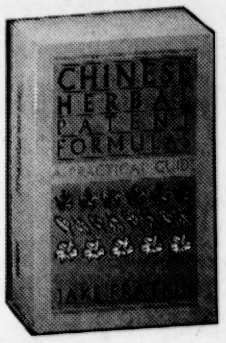
Ever been in a drugstore searching for that one brand of whatever, and your eyes slowly glaze over as you scan hundreds of products on the shelves? Now imagine trying to find something in a Chinese drugstore. This book is an antidote to all that. It takes 225 common Chinese herbal products and for each shows a picture of the box or bottle, and tells who makes it, what it is for, how often to take it, and what it contains. Several brands of American-made Chinese herbal remedies are also described, and all of it is nicely indexed. Since "herb" in the Chinese system of medicine also includes minerals and animal parts, there are products here with ingredients like donkey-skin glue and seahorses. Products are grouped according to what they are good for, so it is possible to use this book to do rudimentary self-prescribing. For anyone unfamiliar with Chinese medicinal products, this book makes an easy introduction to a whole other world of cures.

—Richard Nilsen

Chinese Herbal Patent Formulas

Jake Fratkin, 1986; 356 pp.

$15 postpaid from ITM, 2017 S.E. Hawthorne, Portland, OR 97214 (or Whole Earth Access).



LO HAN KUO INFUSION

Luo Han Guo Chong Ji
"Momordica Fruit Instant Medicine"
Kwei-feng Trade Mark, China National Native Produce and Animal By-Products Import and Export Corporation, Kwangsi Chuang Autonomous Region Branch; Guangxi

Mormordica Fruit (*Luo Han Guo*) soothes the lung and resolves phlegm, cough, and labored breathing. Pleasant to the taste and easy to prepare. This product is dissolved in hot water to make a tea.

Boxes of 12 small boxes, each with two doses. Take one cube at a time, and dissolve in one cup of hot water. Take 3-6 times per day.

Mormordica Fruit	95 %
Sugar	5

Herbal tea, one of the basic tonics of Chinese medicine.

Chinese Herbal Medicine

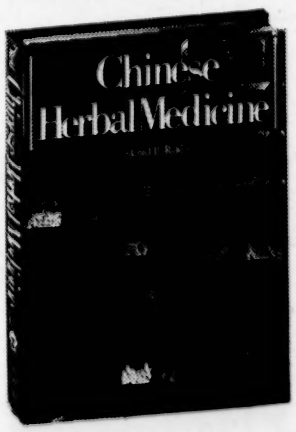
This is the coffee-table version of a book on Chinese medicine for the West, but I don't mean that as a slight. Of the books reviewed here, this is the one to get for an introduction to the subject. It is the only one with color photography, often two-page photographs that serve as background for text. It covers 200 of the most common herbal remedies, in a three-to-a-page format, including color illustrations. The text explains the medicine in the context of Chinese culture, and has wonderful photographs of medicine being practiced in China.

—Richard Nilsen

Chinese Herbal Medicine

Daniel P. Reid, 1987; 174 pp.

$29.95 ($31.45 postpaid) from: Random House, Inc., 400 Hahn Road, Westminster, MD 21157; 800/726-0600 (or Whole Earth Access).



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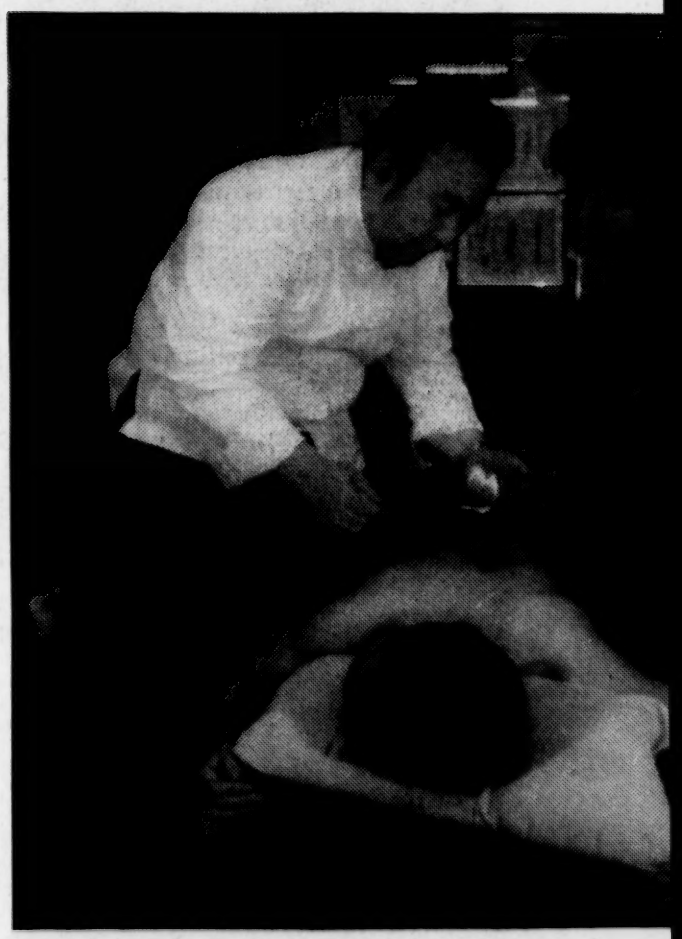
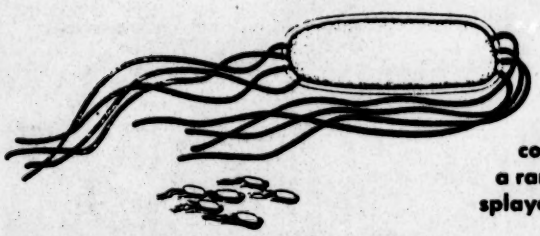
Within a matter of a few years, Chinese medical science — certainly at the level of the wealthier and middle-class Chinese — was engulfed and relegated to a secondary role by Western medicine. It was usurped not because its theories and treatments were necessarily redundant, or wrong, or disreputable, but because of a basic philosophical difference between the two practices. In the religion of thought and action that encompassed herbal medicine, the thrust of the medicine itself was toward preventive care — often a long and ponderous study of all aspects of a patient's condition, physical and mental, ancestral, and even environmental. Chinese physicians tended to reject the idea of instant remedies, believing that most illness and debilitation were the result of deep-rooted problems and that without continuous long-range treatment the root-problem would simply manifest itself again and again, in different forms and in different parts of the body.

Twentieth century Western medicine, on the other hand, brought with it the art of surgery, more advanced drugs and techniques aimed at the relatively swift cure of the immediate problem.



In the treatment of rheumatism, sciatica, strain and nerve paralysis, massage is used along with herbal poultices and moxibustion.



Bacterial motion. Bacteria move by alternating between "running," directed swimming in which flagella rotate in a coordinated fashion (top), and "twiddling," a random motion in which flagella are splayed out (bottom).

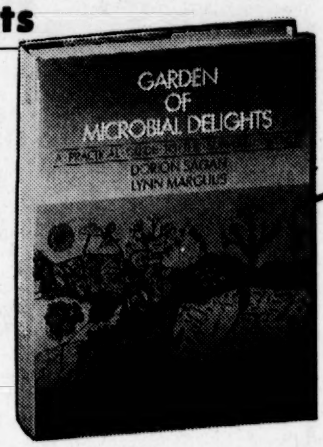
Garden of Microbial Delights

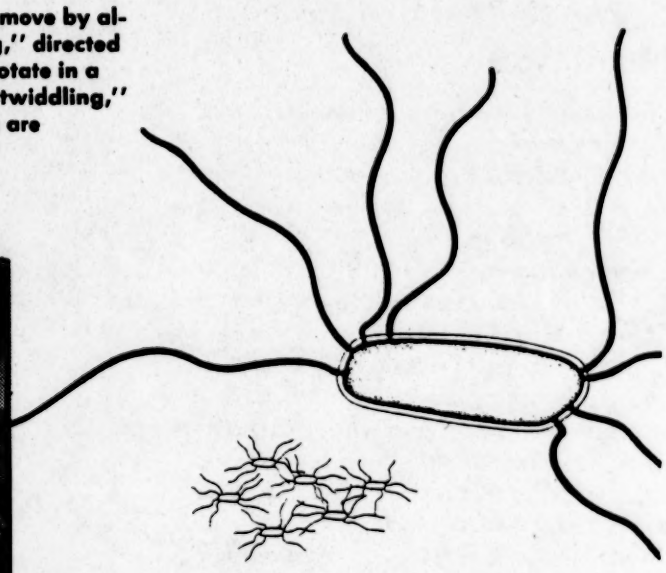
This book makes a long-needed introduction:

Folks, meet the silent majority of life on Earth, the true Gaian citizens: microbes.

Microbes, meet some folks interested in your unrecognized influence and reign.

Fascinating, easy to read, deeply thorough, practical as a field guide, and written by a budding world-class science writer, Dorion Sagan, and his mother, the co-originator of the Gaian Theory, Lynn Margulis. —*Kevin Kelly*





Garden of Microbial Delights
Dorion Sagan and Lynn Margulis
1988; 231 pp.
$24.95 ($27.45 postpaid) from Harcourt Brace Jovanovich, 465 S. Lincoln Drive, Troy, MO 63379; 800/543-1918
(or Whole Earth Access).

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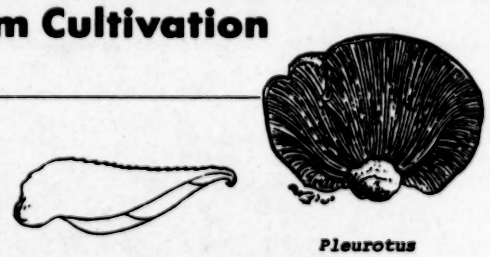
In the future, once the process of photosynthesis — which evolved first in microbes — is fully unraveled, it may be possible to produce pure hydrogen at room temperature. Sending hydrogen gas through pipelines could revolutionize human technology, ushering in a new era simply by applying the ancient technology of photosynthetic cells. By industrially copying elegant technological processes already in use (and what is more, miniaturized) within cells, people could be provided with vast reserves of energy more cheaply, effectively, and safely than ever before. By assembling machines that mimic the respiration of oxygen-using bacteria, we could quietly transform hydrogen piped through tubes into electricity. The gas could also be used for the industrial manufacture of plastics, rubber, record albums, food, and other items currently made from petroleum products. All this would be an enlargement and elaboration upon processes already taking place inside a single plant cell — processes that evolved in bacteria many millions of years ago. It appears that these supposedly inferior, lowly, simple, and primitive life forms may still have a bit left to teach us.

•

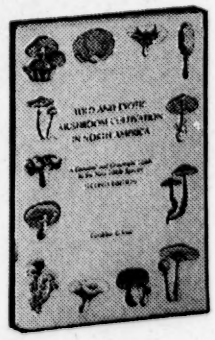
Microbes are, and have been for millions of years, the dominant (most abundant) form of life in the biosphere. Much of the oxygen animals breathe and plants employ in their photosynthetic metabolism originates as a waste gas of plankton — microbes floating in the seas. There would be no agriculture were it not for the widespread presence and fertilizing effects of blue-green and other forms of nitrogen-fixing bacteria. Our forest industry, with its products in the form of furniture, shelter, paper, and so forth, owes its productivity to the continuous growth and chemical activity of microscopic fungi known as mychorrhizae. These fungi break down phosphorus and other nutrient supplies locked up in the rocks and soil into forms usable by the trees' root systems. It is unlikely forests could even grow without such fungi, and fungal symbioses (such as those involved in mycorrhizae) probably were crucial to the formation of the first forests.

Wild and Exotic Mushroom Cultivation in North America

There's a pioneering gang of gourmets, healers, researchers, and entrepreneurs feeding an awakening North American appetite for unusual (to us) cultivated mushrooms. Names and addresses of all the pertinent publications and suppliers are listed in this booklet.
—*Kevin Kelly*



Pleurotus



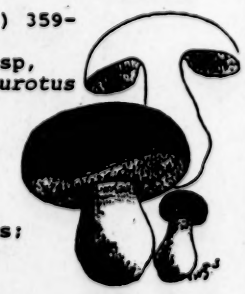
Wild and Exotic Mushroom Cultivation in North America
Geraldine C. Kaye, 1986; 59 pp.
$6 ($6.75 postpaid) from Farlow Reference Library, Harvard University, 20 Divinity Avenue, Cambridge, MA 02138.

Cantharellus

H. And--Now for Something Completely Different...

Mushroom Electronic Bulletin Board Service, c/o Mushroompeople, PO Box 159, Inverness CA 94937; MCI 279-2992. Subscription $30 (6 months), $50 (1 year) plus membership in MCIMail. An Electronic Bulletin Board, which distributes information and two-way communications via microcomputer and MCIMail. Ten sections, devoted to: *Agaricus* cultivation; *Lentinus* cultivation; cultivation of other mushrooms; mycorrhizal mushrooms; mushroom hunting and gathering; market place; cookery; advertisements; book reviews; and calendar of events. Began 1 Sept. 1986. Principal Bob Harris plans to issue a corresponding hardcopy newsletter beginning Jan. 1987.

Boletus



Mycosphere, Inc., Rt. 1, Box 158, Forest Grove OR 97116; (503) 359-5663. For-profit. J. Preston Alexander, Pres.

Spawn, etc.	*Pleurotus* spp, *Lentinus edodes*, *Hericium* sp, *Stropharia* sp, *Laetiporus sulphureus*; *Pleurotus* kits. Cultures: native and foreign
Supplies	Filters
Research on	Fungal differentiation; growth regulators
Courses Offered on	Cultivation
Other	Food products
Brands	Truffle Butter; Oregon Truffle Butter
Future Plans	More species of spawn, cultures, and foods; supplies; information retrieval service
Catalog, Price	Spawn list, free

A New Bacteriology

Having refined our telescopes and launched space ships, our knowledge of the macroworld has increasingly enlarged. But we have yet to find signs of life elsewhere.

Also having refined our microscopes and other infra-probing tools, our knowledge of the microworld has increasingly deepened. In ***A New Bacteriology*** *Dr. Sorin Sonea and his late colleague Dr. Maurice Panisset put forth the hypothesis that a near-alien life form exists on this planet.*

> *"Bacteria are radically different from all other living creatures. Had they been discovered on Mars, their description would have been much more dramatic and the bizarre quality of their natural history, which often seems like science fiction, would not have been missed."*

In their short book, the authors advance the hypothesis of a unitary bacterial world, i.e., the bacteria (prokaryotes) constitute a planetary clone, a superorganism. Unlike eukaryotes — everything else living in the world from amoebae to truffles to redwoods to ***Whole Earth Review****ers — bacteria cannot be conceptualized as forming distinct species. As a consequence they evidence a non-Darwinian evolution.*

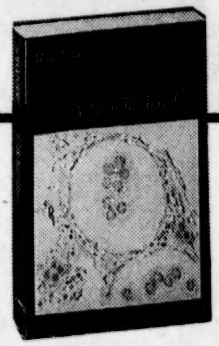
They also have extraordinary communicative abilities:

> *"Bacteria communicate by passing genes from one type of cell to another, a behavior that differentiates prokaryotes from eukaryotes more than any other characteristic, just as speech distinguishes humans from all animals. Thus each bacterial cell benefits from a very large gene pool (all the genes of a population that exchanges genes among its members) that probably extends to all bacterial genes on Earth. This gene pool may be compared to the central data bank of a large electronic communications service."*

Lynn Margulis states in the foreword that small replicons (self-reproducing DNA molecules)

> *"are passed among bacteria with the rapidity and fluidity we associate with international telephone calls and transoceanic cables. . . . Their spores are comparable to satellites, their communications systems form a worldwide network."*

Is this true? If so, or mostly so, or even if not so, Sonea and Panisset make us ponder and wonder. —Laurent Caron



A New Bacteriology
Sorin Sonea and Maurice Panisset
1983; 140 pp.

$10 ($11.50 postpaid) from Jones and Bartlett Publishers, Inc., 20 Park Place, Boston, MA 02116; 800/832-0034

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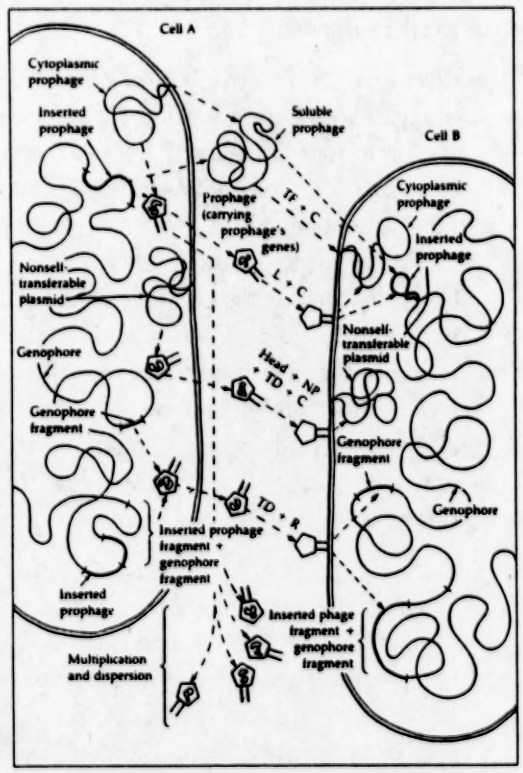
Like an electronic communications network, the bacterial world possesses an enormous data base, in this case in the form of bacterial genes. Both also possess a mechanism that permits them to choose the right solution to a specific problem. In bacteria, the choice is made by means of local bacterial selections, thus amplifying the number of favorable genes and shunting them along circuits of genetic exchange to the strains requiring such information. This biological communications network, which possesses more basic information than the brain of any mammal, functions in a manner that sometimes resembles human intelligence. For example, man uses tools when he requires them but does not carry all his tools at all times. Bacteria temporarily carry their small replicons containing typically bacterial tools, that is, genes coding for certain enzymes. These shared small replicons can readily be exchanged for others if circumstances favor bacteria with different plasmids or prophages.



Ways in which a prophage may transmit genes from one bacterium to another. NP = nonself-transferable plasmid, C = conversion, L = lysogenization, R = recombination, TF = transfection, TD = transduction.

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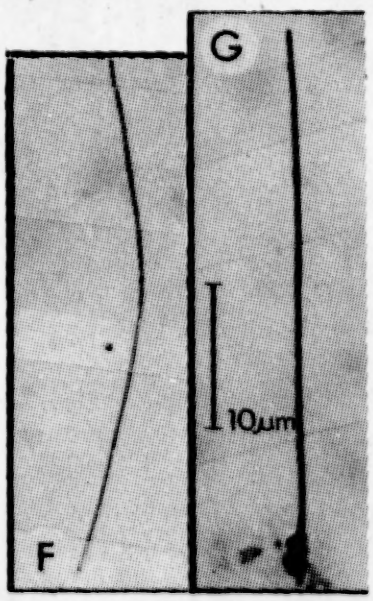
Among the most successful ectosymbioses is the one between very complex animals and very efficient teams of bacteria that are inside the digestive tract but outside the tissues and cells. . . . The ruminants and the bacteria carried in their rumen are a very evident example. Cows, sheep, goats, buffalos and all their wild relatives, and the deer family could not survive in nature without their rumen bacterial teams. The same is true for the bacterial cells involved, as the animal cells of such a ruminant are part of their ecosystem.

Earth's Earliest Biosphere

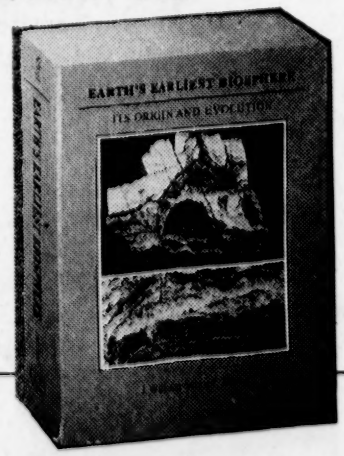
This is the technical encyclopedia about the greatest event in our planet's history: the period when living creatures (mostly algae and bacteria) began to pump oxygen into the atmosphere. From the galactic point of view, it was this creation of this "abnormal" atmosphere that opened the doors for the evolution of larger and more complex plants and animals. Without this grand microbial revolution, the planet would still be spinning but without a living navigator. Too expensive and detailed for even the most passionate Gaia devotees. But, while in the library, it's wonderful browsing.
—Peter Warshall



Earth's Earliest Biosphere
J. William Schopf, Editor. 1983; 543 pp.

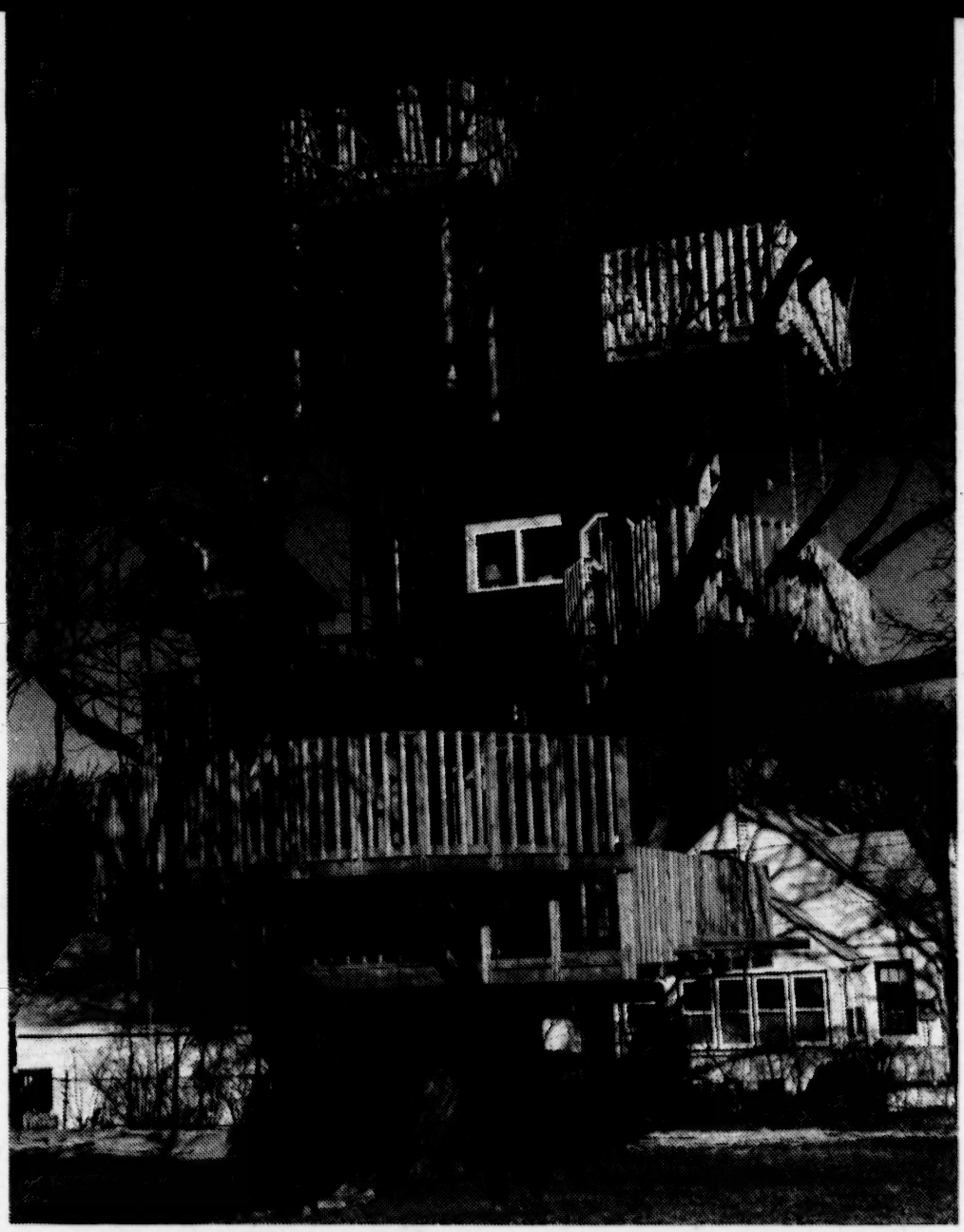
$49.50 postpaid from Princeton University Press/attn.: Order Dept., 3175 Princeton Pike, Lawrenceville, NJ 08648; 800/777-4726.

Elongate rod-shaped, apparently nonseptate fossil bacteria shown in a petrographic thin section of stromatolitic black chert from the 3.5-Ga [Giga anna — 10^9 years]-old Warrawoona Group (Pilbara Supergroup) of Western Australia.



Confessions Of A Treehouse Dweller

BY BIRDLEGS



All photos by Birdegs

(Above) Insurance was sold out of the home/office in this treehouse built in a suburb half a block away from the building inspector's office.

(Below) Straightforward wood bracing for a treehouse perched in the crotch of a maple tree.

FEW CINEMATIC IMAGES from my youth are as strong as the treehouse scenes in *Swiss Family Robinson*. The ingenious house, with pulleys and waterwheels fashioned from a shipwrecked boat, is deeply etched in my memory. And like a surprising number of Americans, my dreams of living in such a house did not end when the Robinson family was rescued and sent packing for the suburbs of Lucerne.

Over three years ago, I built my own monument to that childhood vision, 15 feet up in four Douglas Fir trees in the Cascade Mountains of Washington State. I love it up here. I love the gentle rocking motion of the house in an afternoon breeze. I love getting a close look at the birds, flying squirrels and other forest creatures that live in the trees with me. I have a good combination of the romantic and the practical up here, though it was mainly for practical reasons that I built this house in the air.

In the Spring of 1985, I was faced with an enforced change of abode. I live in a rural area and rental housing is tight. Rental houses are either too expensive and fancy or are affordable, but lack insulation, water, or both. Besides, I reasoned, who wants to pour money down the rental rathole anyway? Buying land was a financial impossibility due to a hungry, new business venture. What to do? The notion of building a small cabin on someone else's land was an intriguing, yet illegal option. Local zoning is for one dwelling per twenty acres and building a cabin on the ground invites discovery. The treehouse seemed more discreet and lower in ecological impact.

I approached a friend who owned a small, unused patch of woods. We talked it all out and negotiated our own written contract that we both signed in front of no lawyers! The guts of it are: I build the house out of my pocket (a $2,500 investment); I pay a small monthly rent; I get to live here for as long as she owns the property and she will inherit the treehouse when I die.

Our arrangement has worked out just fine. I figured that if I lived up here two years, I'd be money ahead on what I would have paid in rent, plus I would get the invaluable experience of building a house, which I'd never done before. Sometimes I get scared and think that I have put too much effort into land that is not "mine." A close look at the rental market brings me back to a feeling of gratitude for this opportunity to study "non-attachment" close up.

The actual building was a lot of fun. I relied heavily on the helping hands and minds of friends, who were like my own private Peace Corps. There is something about a tree that brings out the creative spark in people, and so the house plans evolved greatly as I encountered limbs, trunks and gravity in new and unusual ways. Words like "square" and "level"

The treehouse-dwelling author of this article values privacy, but is nonetheless gathering tales of life atop the Bower of Bliss. Those interested in sharing their arboreal lifestyles should contact Birdlegs at P. O. Box 218, Husum, WA 98623. —*Richard Nilsen*

A view of treetops from the fourth floor of a five (so far)-story treehouse in a cedar grove. This room is 60 feet off the ground, pierced by the twin trunks of one of the support trees.

became relative concepts and were only rough guidelines, not ends in themselves. My only regret in the design of this house is that I didn't build high enough off the ground. This is, I have found, a common mistake that only the guy who built his treehouse 95 feet up in a tall coastal fir didn't complain about.

Building the actual floor platform itself was the hardest job. Once I had a flat floor to work on, the rest of the house was of basic stud-wall construction with a few bends and bows for the trees. I attached the house by drilling a one-inch hole clear through each tree and inserting a three-foot piece of "all thread." This sounds harsh, but with careful application of pine tar every year, the trees appear to be as happy and healthy as ever. The result is a 16' x 12' cabin with a gabled roof, large deck, sleeping loft and 6' x 8' cupola added to the top. The cupola has an anemometer, rain gauge, sunning porch and window seat that folds out into a choice bed. I have electricity, a small electric refrigerator, propane cookstove and a tiny little Jotul wood stove that will drive you out of here on the coldest of winter's nights if you don't watch it. The R-11 and R-16 insulation in the walls, floor and roof keep the house warm a good while after the fire dies down. I've never installed running water, which is a testimony to my laziness more than any physical restriction. It's comfortable and cozy and sometimes it takes a stiff breeze to remind me where I am.

Now that the basic house is built, lots of additions come to mind, for the treehouse dweller is always thinking of ways to expand his world. A rope bridge out to a sauna. A slide from the cupola to a hot (or cold) tub. A tarzanesque "zip line" off through the trees, and higher and higher cupolas. These are the ideas that I think about at night.

LAND DWELLERS usually have several stock curiosities when trying to imagine treehouse life. In my house I have built a tiny "treehouse peehouse" that looks like any privy except that it is 15 feet up in the air. A long metal stovepipe connects the bottom of the commode with the top of the covered pit. A little wood ash from the woodstove now and then covers any noxious smells and the tree roots get some added fertilizer in the deal.

I carry my water, food, wood and laundry up a sturdy flight of stairs. For me it's like living in a second-story apartment without an elevator, but some treehouses have dumbwaiters, pulleys or block-and-tackle systems.

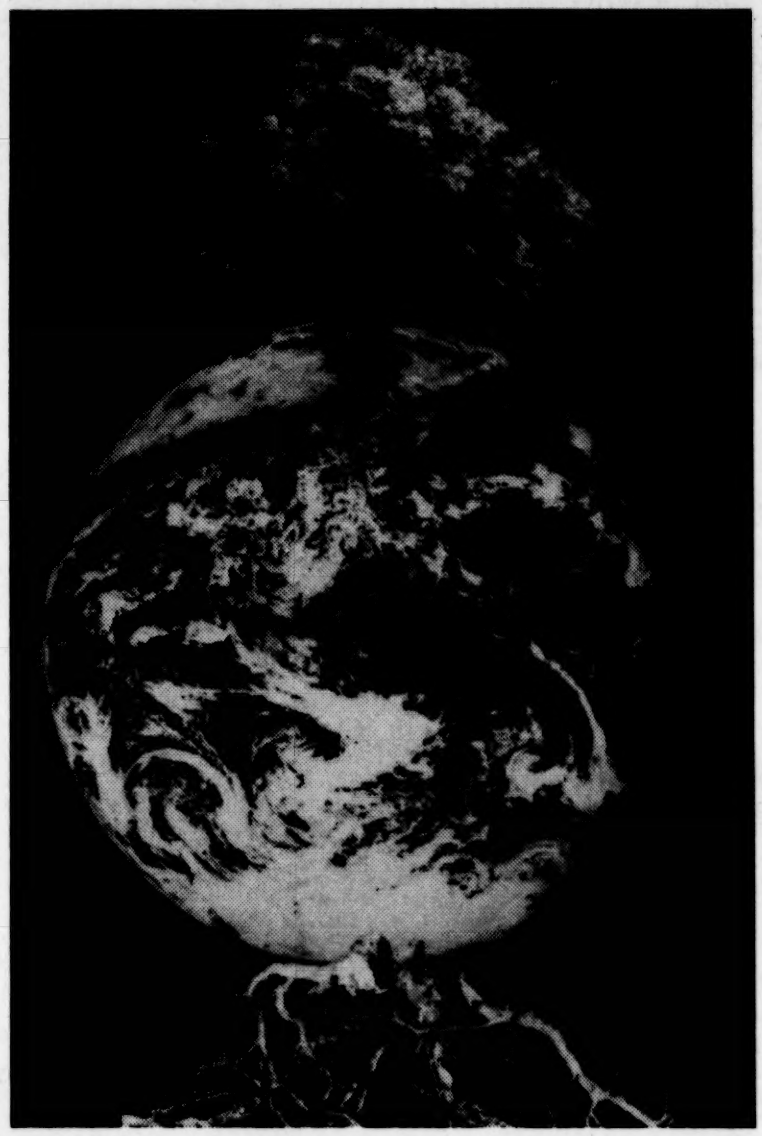
My ant problems have been minimal and the squirrels and I have reached an understanding since I installed chickenwire beneath my floor joists to prevent them from nesting in the fiberglass insulation. I have lots of good birds for neighbors and the three levels make the house ideal for viewing birds in different layers of the forest.

I am nestled a good thirty feet from the tops of these trees and the sad lack of thunderstorms is about the only thing missing from this wondrous Northwest ecosystem.

I don't think I will live here all my life, but I can see treehouses always being part of my life. My Swedish grandfather always had a small "wigwam" out in his backyard, full of books, a fireplace and an old gramophone. Maybe I'm following in his footsteps. I know that I am not the only tree dweller on this planet. In tracking this phenomenon for the past three years, I have uncovered an amazing number of treehouses throughout this valley, this country and the world.

Treehouse dwellers are a diverse and varied group. There is an 80-year-old retired schoolteacher, a man who sells insurance out of his "branch office," and some millionaires who built a $50,000 treehouse for their kids. Some treehouses are as small as 50 square feet and some as large as 3,000 square feet. Oceans seem to spawn treehouses on their shores but I've seen them in the mountain and plains states as well. After three years of searching, I feel I have just scratched the surface of this clandestine world. I envision a treehouse network, sharing ideas, problems and possibly even each other's treehouses like our condo counterparts. ■

The author's home, fifteen feet up in four Douglas Fir trees in the Cascade Mountains of Washington. The protruding corner room on the right is the privy, connected to earth with a stovepipe. Peace with the neighbor squirrels was reached only after the fiberglass floor insulation shown was screened to prevent nesting.



The Gaia Peace Atlas

The Political Economy of Deforestation

by Peter Warshall

AS A MANIACAL TREE LOVER, my first act when I moved to California was to sleep in a virgin forest of each major Sierran and coastal species. Curl up, with one arm over the smooth root of a giant sequoia, occasionally look for a star through the distant branches, dream deeply in an ancient, ancient boudoir. I feel shy discussing the political economy of deforestation. As an "old fart" ecologist who's heard this deforestation discussion for many years, I worry about repeating the same old same old. Here goes.

I got the first glimpse of Gaian metabolism reading this report by Peter Warshall, filed after his return from ecology-watching in Africa. As a consultant to environmental departments in a number of African countries, Peter's reports are starkly bio-logical and pro-life — including the life of native endeavors such as farming, gathering, and herding. His report on landlocked Mali is setting the standard for national biodiversity assessment.

—Kevin Kelly

The Most Sketchy History of Planetary Deforestation

The conversion of forests to other uses (especially agriculture) and the impoverishment of existing standing forests has been a consistent theme of the 20th century. The trend has many pre-1900s pockets. Greece lost its famous oaks to the axes of northern invaders in pre-Hellenic times. In the 1700s and 1800s, the oak-hickory forests of the American midwestern and southern deciduous forests all fell to wheat, corn and tobacco farms. The forests of southern Europe, Iran, Afghanistan, the Middle East, much of highland China, Nepal, Tibet and Sahelian Africa have been replaced by a shrub/grass complex. Various kingdoms in West Africa (900s through 1300s) deforested areas for metallurgy, especially smelting.

The global timber trade began in the colonial era, starting in 1550 but accelerating after the post-Napoleanic Wars. Countries that had the transport, capital, technology, and political means extracted wood products from every region of the world. The Thai teak trade, the British extraction of naval stores from the American colonies, and Ghana's African mahogany trade are three such sagas. In the twentieth century, industrial economies continue to tap the forests of developing economies to meet their own demand for construction wood, veneer, and plywood. Time after time, private investors join national commercial and political interests. Together, they cash in on the short-term profits to be made from timber exports from capital-starved nations. The most recently popularized example is the clearing of rainforests for timber and the replacement of these forests with pasture for export beef cattle. On the other hand, the developing economies have been, until very recently, completely dependent on the northern industrialized nations (including China) for paper. Their export of timber has, in many cases, almost balanced their import of paper — yielding no net gain in income.

The role of national governments has remained somewhat the same in colonial and post-colonial times. National governments can create an economic environment that accelerates or decelerates deforestation or the impoverishment of standing forests. During the colonial period, colonial taxing policies (especially in Africa) forced men into the timber trade by making them pay in cash (not kind). At that time, the only cash-producing economy in southwest Africa was timber. Today, in Mali for example, taxing of the rural poor forces them to cut firewood for the urban market even though they know that they are cutting too much.

In addition, joint agreements between nations, concessionaires and trading companies and, more recently, bilateral or multilateral agency agreements

have been a major accelerating force in deforestation. For instance, in the colonial period, companies received timber access and cutting rights in exchange for building railroads. Today, the World Bank tries to stabilize external debts with loans to projects that accelerate deforestation. The Brazil Polonoroeste Project, India's Naramada Valley Dam Project, and the Indonesian Transmigration Project (all, in part, supported by the World Bank and other international development banks) have subsidized, encouraged or required millions of acres of deforestation.

There is a Japanese variant (1950s) which did not rely on Western capital. Early in this century, Japan realized that harbor facilities and imports were cheaper than local harvesting in rugged mountains. While this saved Japan's forests (Japan is one of the most forested nations despite high population), it led to a complex history of Japanese access and use agreements to forests in Southeast Asia and the Soviet Union. This pattern has recently been repeated in the Pacific northwest of the U.S. (a long story).

In short, the global timber trade is merely one aspect of a complex net of economic activities that consume varied natural resources (minerals, soils, water, petroleum) and alter arable, grazing and timbered lands on a worldwide scale.

Stabilized Forest Regrowth

Certain nations — post-1900 U.S., Japan, and Europe (but not the Soviet Union) — stabilized their forest coverage, although not with the same species that previously existed. What can be learned from this stabilization? First, the intensification and mechanization of agriculture (maintaining or increasing production on equal land areas) reduced the demand for new farmland. In New England farmland was left fallow, major grain farming switched to the Midwest, New England soils wore out, and wage labor migrated to the cities. The abandoned northeastern farms regenerated. This is the major acreage of reforestation in the U.S. — far surpassing tree plantations or reforestation schemes. The second and third growth New England forests are, in fact, exceptionally diverse because they naturally reseeded. Recently, suburban sprawl and acid rain have reversed the expansion and regrowth of these temperate broad-leafed forests.

In other parts of the world, agriculture has increased production by expansion. Large expanses of forest have been cleared or greatly modified for peanuts (Africa), cotton (Africa), rice and tea (India), coffee (Africa and South America), and local grains such as millet, tef, maize, sorghum. Recently, land clearing for beef export has reduced forests in much of Latin America. This conversion of forests to other uses is a major, usually undiscussed, topic in deforestation.

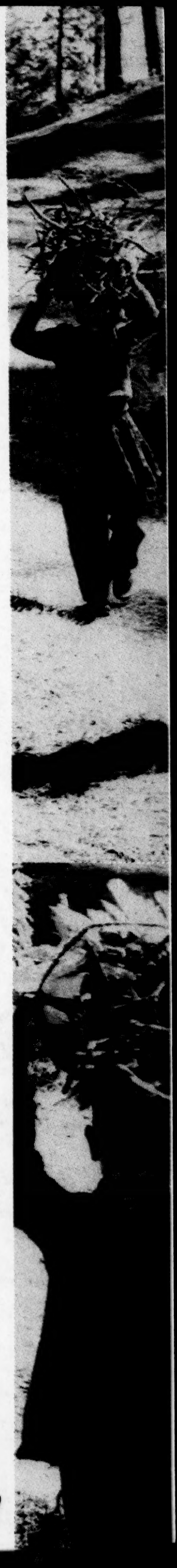
Second, the U.S., Japan and Europe made a significant shift to both coal, petroleum, hydro- and nuclear power for heat energy for both homes and industries. This took the burden off wood. Wood became part of "middle-class primitivism" — the male-does-the-barbecue with charcoal and mesquite chips, cuts the ceremonial Christmas tree, and burns the ceremonial yule log. In other nations, wood still provides all the home cooking fuel and heat.

Third, Japan, Europe (especially Britain) and the U.S. switched to using other nations' wood resources and "banked" their own. Having depleted the Carib and northern Central and South American wood stocks, Europe extracts wood from West Africa and Malaysia. U.S. timber and wood products come from the Philippines and Brazil. Japan, Taiwan, Korea, Hong Kong and Singapore all extract timber from Indonesia and the whole of southeast Asia. In the U.S., access to and use of foreign woodstocks also allowed the American wood-products industry to have a very enlightened policy (comparatively) on regrowth of softwoods. The American industry had a "window" in which to make long-term (not quite sustained) investments in private forests as well as learn how to efficiently grow trees on farms.

Fourth, the extraction and trade of wood products has a technological component. For instance, tropical woods have a fiber structure that has resisted pulping. However, with new methods, tropical wood can now be separated into fibers and made into paper. Tropical forest cutting is changing from selective cutting for specific trees to clear-cutting for both timber and pulp. The terms of trade (bargaining hardwoods for paper) may also change as developing countries begin to manufacture their own paper.

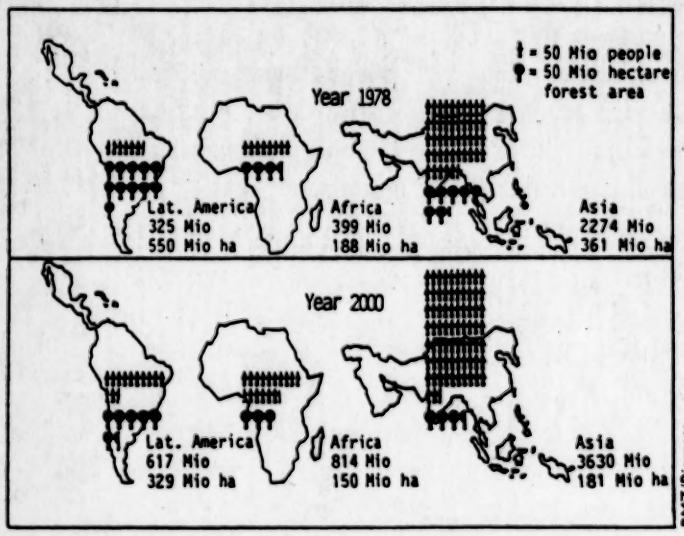
Fifth, hardwood products have definitely become luxury items. The price difference between a solid oak or mahogany table top *vs.* a table top with oak or mahogany veneer plus plywood *vs.* a formica imitation-wood table top is a symptom of global hardwood scarcity. Our children will probably live in a world of hardwood substitutes (e.g. aluminum chairs, fake paneling, particle board) as good hardwood logs become as rare as elephant ivory. The rate of hardwood regeneration will be controlled by technologies and markets for recycling paper products and wood, product substitution, government controls on extraction, luxury pricing, and process advancements (i.e. making more efficient use of the total log).

Finally, Europe and the U.S. have supported some



Sue Darlow/Format

In the Indian Himalayan province of Uttar Pradesh, wood gathered for cooking fuel is a prime cause of deforestation.



Decrease of forest area and increase of population in the developing countries (1982).

regrowth because of the conservation movement and tourist industry. For instance, the tourist industry has become a major incentive for less developed nations to preserve forests within National Parks. The conservation movement can take credit for preserving quality forests (interesting species and high species diversity) more than for large acreages of reforestation. Still, only 6 percent of U.S. virgin forests remain, and much of this forest will be cut because of the high prices of old-growth timber. Almost every major U.S. endangered-species battle (the Mt. Graham spruce squirrel, the red cockaded woodpecker, the spotted owl) is really a battle over old-growth forest or rivers.

Quick Summary

The crucial new aspect of the global wood-products economy is this: the industrialized nations of Europe, Japan and North America had the opportunity to relax exploitation of their own hardwood forests and utilize the forests of other regions of the world. The new developing nations not only need the income that comes from selling their hardwoods but have no alternative regions to exploit to meet their own needs and slow down the exploitation of their own resources. Combined with the unstoppable growth of the human population, the "new global economy/ecology" implications are obvious: the regeneration and long-term sustenance of the developing world's forests will have to come from a very different organizational and financial base than now exists. We would all do well to avoid becoming armchair ecologists and begin to conceive of global actions that will help formulate this new organizational and financial base.

Lessons and Actions

(1) *For many parts of the developing world, the trade in timber as a major commodity has been far less important than the expansion of export agriculture.*

To take pressure off the remaining forests, agriculture in developing nations needs intensification. There is simply no easy way to stop the conversion of forests to agriculture without slowing population growth and producing more food per acre.

Agricultural products serve two goals: feeding the people and cash income from exporting. The non-petroleum countries in particular require export-derived cash from crops or minerals to purchase much needed petroleum-based goods (especially fertilizer). It may be possible to slow forest conversion by creating special export agreements.

These export agreements would guarantee price stability and commodity markets. In exchange, the developing country would agree to set aside particular forests. Price stability for exported agricultural products as well as price stability for imported petroleum products are as important as profits in the third world. These are risk-avoidance, not risk-assuming economies. Stabilized currency is part of this issue.

A "sectoral" approach, in which forestry is isolated from agriculture, livestock and fuels, has not been successful.

(2) *Industrialized nations took pressure off their forests by switching fuels.*

In countries deforesting for firewood, subsidized prices for propane, butane or kerosene heating/cooking fuels will take some pressure off forests. The price of the petro-fuel must be held competitive with firewood. The petro-fuel price ideally should be just below firewood. Encouraging petro-fuel stoves is only feasible in urban areas. Again, price stability is important if the urban public is to switch from wood to petro-fuels. In rural areas, the additional transport cost pushes petro-fuel prices beyond the means of most villagers.

Some donors, including the World Bank, have suggested raising the market price of fuelwood. This will not reduce deforestation in rural areas where fuelwood is outside the monetary economy. Even in rural village markets, the price of fuelwood cannot be increased too much. Raising prices simply forces fuelwood into the black market and increases woodpoaching.

In some rural areas, new, more efficient wood stoves have reduced firewood consumption by 20 to 40 percent. Laws against the use of charcoal (such as those enacted in Ethiopia and Senegal) have also helped reduce the inefficiencies of wood-fuel use.

(3) *The links between corporate interests and govern-*

ment encouragement of economic development lead us to the role of political lobbying and "perverse incentives" in deforestation.

"Perverse incentives" are economic incentives that encourage non-sustainable use of natural resources such as forests. Brazil wins the award for the most perverse incentives for ecological destruction in recent times. Subsidized loans, tax exemptions and investment tax credits encouraged deforestation for cattle ranching. Thirty percent of the cleared rainforest can be attributed to these perverse incentives. The result is an enormous financial burden on the government, rapid degradation of soil fertility, rapid loss in cattle-ranching profits, and massive deforestation.

The most amazing lobby is, of course, the Pacific Northwest timber lobby in the U.S. They have caused changes in the measurement of board-feet and trade laws; modified environmental laws and access laws (roads *vs.* roadless areas), etc. But this is an old story — retold in the histories of the land companies of the Parana pine forests of South America and the loggers' lobby in Tasmania.

At the moment a rather immature but increasingly powerful "Green movement" is the only alternative political lobby. There is no lobby for sustained yield and biological diversity within the corporate community or international development banks. The Green movement will force laws that will be populist but may lack the more sophisticated understanding of international trade, pricing and organization that corporate minds can supply. Upcoming laws, for instance, may prevent paper made from tropical wood pulp or rainforest hardwoods from entering the U.S. and other European markets. Corporations, multinational banks and labor interests have a choice of taking the lead or being forced, nation by nation, into a more reasonable and updated forest management policy.

No bilateral agreements will be effective. A multilateral agreement on timber harvesting will be necessary. Without this global agreement, some other nation will simply step in and corner the deforestation market. Japan is a major contender for this role.

In 1987, the International Tropical Timber Organization was formed. It now includes 24 consuming nations and 18 producers. They account for 70 percent of all tropical forests and 95 percent of all tropical timber exports. They do not try to control pricing but try to increase market intelligence, reforestation, forest management, and local processing of logs. They are the International Whaling Commission of hardwoods.

We may need to think locally and act globally. That is, thinking must start with the watersheds logged and the best management practices for long-term, multi-purpose forests. The actions will be international in order to harmonize local watersheds with global forestry products' trade and extraction.

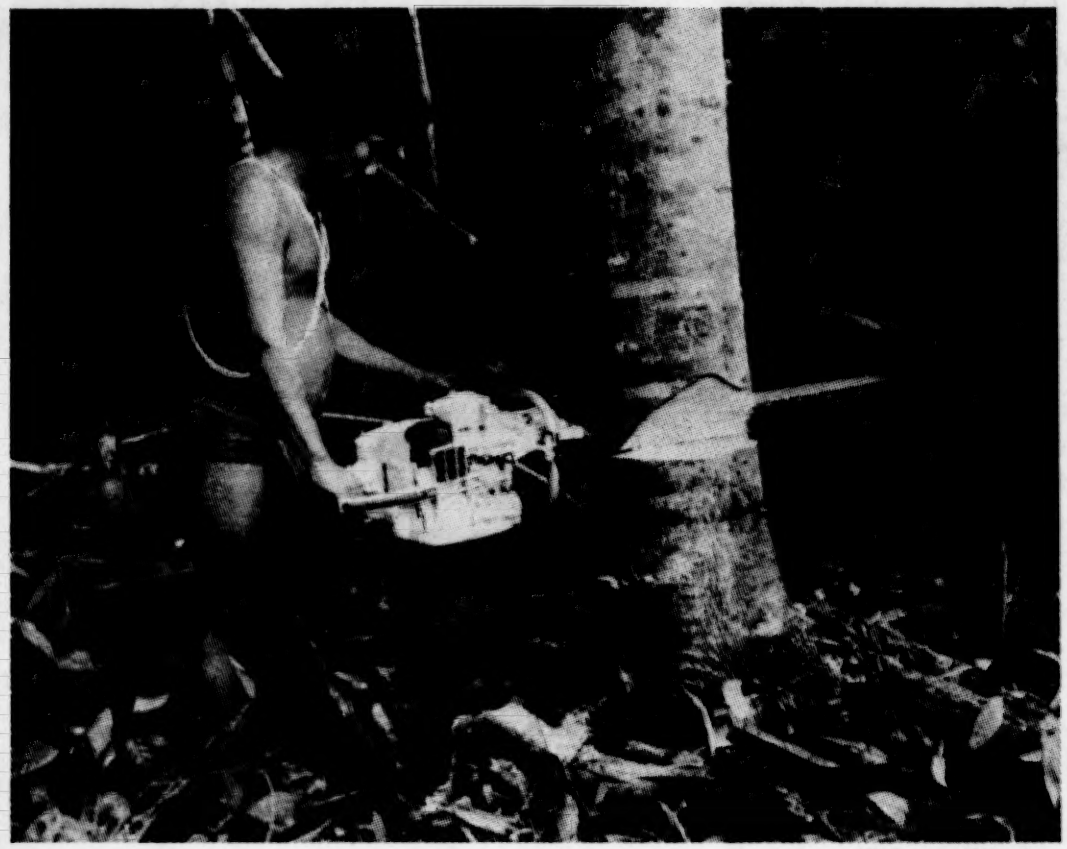
(4) *Since colonial times, local populations have been uprooted in order to meet the cash needs of their families.*

Uprooting has had a major influence on deforestation by destroying "sustained-yield traditions" based on passing specific trees and cutting rights from one generation to the next. In Niger, at the time of birth, the umbilical cord is buried with a hardwood or other slow-growing tree and the tree dedicated (an assigned asset) to the baby. In colonial times, cash taxes were so high that men migrated to find cash jobs to send back money to avoid losing family lands. Sometimes uprooting was the by-product of other circumstances. For instance, in Kenya, health services reduced childhood mortality; therefore too many sons survived for the amount of family land. Uprooted sons have two choices: deforest more land for agriculture or migrate to the cities for industrial labor. Yet in many nations, there is no industrial base.

ationalization of trees has meant that "outsiders" have equal access to forests that local people claim.

In addition, in the name of long-term sustained yield, many colonial governments designated forest reserves. These reserves limited access by traditional peoples who had always controlled wood harvesting on a local level. The new (neo-colonial) nation-states adopted these reserves and "nationalized" the forests. They did not return stewardship to village control. Nationalization of trees and forests has meant that "outsiders" (especially urban traders) have equal access and use rights to forests for firewood and other products that local people claim are under village authority. The urban traders do not re-invest part of their profits into reforestation.

The result is a confusion in land tenure (tree tenure?). The rules on access and use of trees have not been resolved in many parts of Asia, Africa and Latin America. (Europe and the U.S. started resolving these issues in the early twentieth century. In the U.S., of course, debate still rages concerning the proper uses of forests on public lands.) In the minds of many peasants, there is little difference between the colonial and national authorities. Both have undermined the local, village system



UPI/Bettmann Newsphoto

New technologies in extracting wood fiber from tropical trees have shifted the world trade in trees to warmer, third-world forests.

By offering subsidies and tax incentives, Brazil has encouraged massive tree-cutting by its own people, including indigenous forest-dwellers.

by preferential treatment of urban or elite power interests within the developing country.

To limit deforestation in developing countries, perhaps the most important needs are conflict resolution between traditional and national authorities and the establishment of secure land tenure. Without secure land tenure, there is no reason for peasants and farmers to be interested in long-term sustainable forests. The International Union for the Conservation of Nature (IUCN) is one of the few groups which employ anthropologist-type facilitators to assemble interest groups and work out a consensus, i.e., a signed natural-resource management agreement between villagers and national authorities. (See "The Bouna Agreement" sidebar.)

The national governments of developing nations will need encouragement to decentralize forest management practices. Having just gained sovereignty and power from colonial powers, they must now give up some of that power to the people. The writing of new (post-neo-colonial) forestry codes could be greatly helped by sympathetic foresters from the industrialized nations who understand tropical species and how to structure local forestry management.

(5) *Is global management of the wood-products industry the best way to decrease and reverse deforestation?*

For instance, since the 1950s, log exports from the U.S. to Japan have encouraged a more bureaucratized, centralized, economically rationalized (but less egalitarian) order. Weyerhauser tracks the Japanese market. The Japanese track the American markets (many pulpwood plants in Alaska are Japanese). The new wood-products trade may be more economically integrated and show short-term increases in wood-products income. It may provide a more careful worldwide pattern of timber resource use from the point of view of supply-side economics. But there is less room for participatory democracy and citizen control — something that both Americans and, to some extent, the mountain villagers of northern Japan (who have suffered from cheap U.S. log imports) cherish. The "sides" in the new order appear like this: large operators tend to profit from and support recent events in the timber trade; small operators have been hurt and oppose it; industrialists tend to favor wood-products trading; wood workers and small-time entrepreneurs oppose it; port areas both profit from and support it; more isolated rural communities go broke, and oppose it.

Environmentalist concerns are somewhat different — they want to preserve old-growth and local genetic varieties in a world rapidly becoming forests of second-growth or monotypic tree farms. They want to protect fisheries, stop soil degradation caused by timbering (long-term productivity), prevent watershed collapse, and stop health problems caused by herbicides currently employed to increase forest regrowth. In a few instances, environmentalists have teamed up with rural communities. They have joined workers in what most economists call marginal sawmills. They have occasionally joined other "localists" to fight for more influence on multinational decisions. Both the "localists" and the environmentalists increasingly understand their isolation from seats of power.

Indonesia, confronted by problems of local unemployment and extractive Japanese timber traders, banned the export of raw logs so they

could develop their own de-barking and plywood industry. Similarly, the U.S. banned exports of raw logs from federal lands in order to help local operators but, in part because of the location of state and private lands as well as stumpage fees, this ban was not very successful.

Will local decision-making and economic self-determination have any meaning in the global economy? Will local decision-making improve forest management compared to an integrated global economy? If we value economic self-determination, how can we preserve it?

The U.S. Forest Service, despite grave lapses, has been pretty effective in slowing down the grossest deforestation for short-term greed. Public surveillance of national forestlands in the U.S. is thorough and committed. Despite the continued erosion of the law by recent administrations and by congressmen of both parties, the National Environmental Policy Act has become a model for international impact analysis. But citizens do not have any real power to control access and use of their own watershed forests. European forestry services and public surveillance have more rigid rules on access and use of forests — both public and private. This is not true in developing countries where there are confusions between "public" and "private" land tenure, lack of "case history" law to support land-tenure decisions, and lack of appeal procedures to prevent abuse of existing forestry codes.

How can the international community help other nations increase democratic participation in the management of forests without getting the process confused with a new form of cultural imperialism? How does the international community encourage a legal framework in which a nation's citizenry can monitor deforestation? Do we give up this path and try for global control?

(6) *There are many articles and books by economists on the real costs of tree removal. Prices do not reflect real costs. Forests are terribly undervalued.*

The Soviets refuse to talk about forest scarcity except to say it's all "inefficiencies in resource extraction." The real market price of sawnwood is hidden by shuffling money administratively. A similar process in the U.S. hides the real market prices. Timber industries extract wood from federal lands and avoid the costs of infrastructure (e.g., roads) and post-harvest environmental degradation (e.g., road washouts and sedimentation of fish streams). American companies can therefore sell the wood at below total costs. The "externalities" or "non-harvesting" costs are partially picked up by the taxpayer through congressional allocations to the Forest Service. In the Tongass National Forest (Alaska), the U.S. Forest Service spends $100 of taxpayer money for every $1 it receives from private concessionaires. Logging the Tongass cost taxpayers an estimated $50 million in 1988. A guess by the Wilderness Society is that Americans subsidize private logging companies to the tune of $400 million a year.

The question is an old one: What's a fair profit? How much of the difference between extraction cost and market price (sometimes called "economic rent") should go to the government when the forests sit on public lands? How much should be reinvested into reforestation? Because of global environmental concerns, local watershed concerns, and increased need for long-term sustainable forestry, "timber booms" no longer have an ethical and economic function on the planet. In the Philippines, the government captured only 14 percent of market income from logging concessions (1979-82). Virtually all major productive forests in the Philippines have been logged out. In Indonesia, the government captured 37.5 percent during the same period. In the Tongass, the U.S. government captured 1 percent of the extraction costs and less than 1 percent of the value of marketed wood products.

Secondary economic impacts of deforestation may be worse than deforestation itself. This is also an old story. Greece lost its topsoil from deforestation, forcing it into a subsoil economy (grapes, olive oil, pottery) and making it dependent on international trade and a large naval force to import topsoil grains. As early as the 1850s, one can read of watershed management problems in India. The worst floods of almost every major river in South America and Asia can be traced to deforestation in the headwaters. The process continues. For instance, Chinese timber cutting in Tibet has already hurt water quality and increased flooding. The ultimate economic costs in terms of flood relief, health, lost floodplain farming, and housing could never be met by the timber cutters. Good forestry usually succumbs to short-term economic demands.

Finally, forests have been undervalued because their passive economic benefits are not included in settling prices. Forests substitute for engineering. They serve as air cleaners, air moisteners, air coolers, soil builders, landscape stabilizers, carbon dioxide sinks, and much more.

I am not qualified to discuss what should be done to incorporate true long-term costs into the price of wood products. Educating governments and corporations involved in logging, discussing the ethics of a fair profit and adequate reinvestment in forest care sounds terribly cute and idealistic. West Germany has a forest licensing procedure (kind of like a driver's license) for both private and public forests that might serve as a model. Placing "environmental damage" bonds is another possibility. Any real-life suggestions out there? ►

(7) *How to finance recurrent costs of forest management (thinning, reforestation, nurseries, sustained-yield accounting, and forest service agents) is an unresolved issue at this moment.*

Early Francophone West African foresters were all sent to the Ivory Coast to help with the export cutting. No one stayed in the more fragile (yes, more fragile than rainforest) savanna woodlands of the Sahel which held back the spread of degraded grassland (= desertified grassland). As I observed in my recent work in Mali, the Sahelian forestry agents suffer because they do not participate in cash-crop timber harvesting. They sometimes wait for three months for their salaries, forcing them to arbitrarily fine peasants for "illegal" tree cutting and using the fines for their upkeep. Others set fires and then charge the villagers for violating brushfire control rules.

The Sahel requires re-shrubbing.

Shrubs are the most undervalued form of plant life.

Recurrent costs such as salaries are a major problem in cash-strapped countries. Recurrent costs are handled in industrialized nations through taxing (mostly urban dwellers and corporations) to pay for the Forest Service salaries. These taxes are a public "grant" to maintain the investment in long-term production (tree growth), genetic diversity (national parks) and recreation. There is no significant taxable urban public or industrial base within most developing countries.

Possible Personal Actions

There is no room for self-righteousness. Parts of Europe and North America suffer from acid-rain deforestation. These nations have not shown a quick response despite their ability to mobilize much more easily than the developing nations.

The reduction of nitrous oxides (causing tree damage near cities) and sulfate compounds should be a major focus of any discussion of deforestation. It is supposedly a simpler problem in northern industrialized nations than in developing nations because of available technologies (e.g., coal bed reactors) and capital.

I was frankly appalled by the blurb on the back of *Signal* (a *Whole Earth Catalog* about personal communication tools) that said the new world was concerned with information, not materials. The information world (especially word processors, computers, and photocopying) has contributed to the 320-percent increase in U.S. consumption of writing and printing paper between 1959 and 1986. This is exactly the opposite of what the original *Whole Earth Catalog* predicted — saying that computers, photocopying, FAX machines or video-literacy would save trees. *Signal* has no mention of a tree in the whole catalog. If there ever was an important information storage and processing device on the planet (weather quality, soil quality, air quality, fire control), it is a tree. *Signal* did not (as did earlier catalogs) even mention the amount of pulp (tree flesh) required to print the run of books.

What I mean is: actions must always start with personal ethics. Many people try to avoid beef grown on cleared rainforest. This is nearly impossible, because major distributors mix up beef from all locations. The only solutions are: don't eat any beef, or promote a congressional law that requires labeling of all beef, or ban all beef imports from the humid tropics, or eat only beef you know has caused no harm to the environment. All require personal commitments to forest maintenance. The easiest is a beef taboo.

But, equally, how many readers try to reduce their paper consumption? Most of my friends use perforated paper for word-processor printing. One side gets used. It is difficult to turn it over and run it through again because of snags. On the other hand, a sheet feeder can re-use paper that has been printed on one side. All drafts can be done on the back of already-used paper. It is easy to switch to single-side printing for the final copy. My first possible action is then a personal one. Switch to a sheet feeder and make a point to tell your friends why. "Small is beautiful" also means that many small acts can have large effects. In this case, on paper-pulp demand. The same (two-sided usage) can be said for re-using photocopy paper for information networking.

By promoting fuel-efficient stoves, Mali saw a remarkable reduction of demand on firewood in five to eight years. A remarkably short time considering that there was no reason for Malians to trust still one more idea promoted by the Peace Corps, World Bank and other private voluntary and non-governmental organizations. As with energy, the economics of recycling or increased efficiency in wood products have just begun to be explored.

Live brushwood is planted as barriers in the sand dunes of Somalia.

Ecology and Economy

Note that I have not broached three subjects: the Gaian (biospheric) consequences of deforestation, the ecological difficulties of re-planting trees, and population growth. The Gaian importance of forests in regulating the biosphere's atmosphere and water balance is a whole 'nother topic. The ecology (*vs.* the political economy) of deforestation is also a whole other topic. There has been an overemphasis on humid rainforests. All forest communities have their own beauty and purposes on the planet. Each suffers from deforestation, species depletion, and requires thoughtful healing. For reforestation to be successful, each ecological technique for sustained-yield or biodiversity preservation requires an intimacy that will vary by watershed or even opposing slopes of watersheds.

I'll end with some African thoughts.

The Sahel is losing tropical woodlands because of a 16-year drought and a 60-mile-southward shift of lowered rainfall. This deforestation cannot be stopped. Most trees will simply not grow in the new rainfall regime. "Planting trees" is way too simple advice to counter the further degradation of the vegetation and the spread of desert-like landscapes. To protect the land for recolonization by trees when the rains (hopefully) return, the Sahel requires protected pastures and, perhaps, re-shrubbing (re-shrubation?). Shrubs are the most undervalued form of plant life in environmental thinking because, in temperate climates, they appear so useless. In the tropics, shrub savannas provide firewood, browse for goats and wildlife, increased grass production for cattle and wildlife, medicinal plants and wild human foods.

The reforestation of the Sahel has failed because of many factors: the obsessive focus on trees, poor nursery stocks, no supplemental irrigation during the seedling stage, no additions of microbial inoculae or minerals to the soils during planting, and no way to fund recurrent costs of tree care (similar problems exist in China).

So here's what I mean by new organizational and financial forms. Pick the best organizational form to accomplish the job. In some areas, it will be the nation-states. Some futurists are promoting ethical corporate control. Still others see the solution in education. In parts of Africa, I see the moving force to be religion. In my scenario the Saudi Arabian government promises Islamic Africans a free trip to Mecca, if they care for a grove of 100 trees for ten, twenty years (depends on species, watershed, etc.) The family or village woodlot has guaranteed (by signed agreements) tree tenure. The village receives aid from bilaterals (USAID or Japan) or multilaterals (World Bank, EEC) in terms of technical assistance (inoculum, tools, fuel), supplemental irrigation (if needed), and nursery development (a major gap in development aid programs).

This scenario provides villagers a long-term goal, greater security, symbolic as well as financial reasons for maintenance of the trees, reduced recurrent costs to nationals and donors as well as an integration of secular needs with religion. (Note: in much of Africa, Islam has been the force of democracy — opposing tribal factionalism.) The religious solution replaces the "industrialized nation" model in which hidden taxes are used for the long-term preservation of natural capital (watershed management, pasture regeneration). This scenario has only raised eyebrows in Washington, where I first presented it. But, as soon as everyone laughs, they go back to discussing their failures in anti-desertification programs and stabilizing the world's forests. ■

Reforming the Forest Service From Within

The Crusade of Jeff DeBonis

BY RICHARD NILSEN

IN 1517 A CATHOLIC PRIEST NAMED Martin Luther nailed his Ninety-five Theses to a church door in Germany. If that was all he had done, there might not be any Lutherans around today for Garrison Keillor to do monologues about. But Luther also sent copies to his bishop and to the archbishop of Mainz and, printing having been invented, copies were made and circulated. The eventual result was the Reformation.

Jeff DeBonis, 38, is a Timber Sale Planning Forester with the Blue River Ranger District of the Willamette National Forest in Oregon. He has over 10 years with the service on different forests, and before that was in the Peace Corps in Ecuador. A transfer last fall to the Willamette and a few months' first-hand experience in one of the most productive woods in America turned his hand this past January to the keyboard of the Forest Service's internal mail computer network. Click, click, click. . . . Not only did the memo he circulated call a chain saw a chain saw, he also connected the effect of those saws to the rest of Oregon's economy.

> Between 1979 and 1989 the timber harvest on federal lands in Oregon increased 18.5 percent. In that same period, employment in the wood-products industry dropped 15 percent. . . . the claim by the timber industry that employment is tied to the harvest level on the national forests is simply not true. The real impact. . . . is the automation and modernization of mills. . . . Weyerhaeuser is considering replacing its current mill in Coos Bay with a mill of West German design which will produce the same output with only 25 employees as it is now producing with 250.
>
> Industry claims that if the wood-products industry in Oregon declines, so will Oregon's economy. This is untrue. . . . The lumber and wood-products industry now contributes only 6 percent to Oregon's total economy. In the last decade, [while] employment in the wood products industry . . . dropped 15 percent . . . total employment in the state is up 24 percent.
>
> This is happening because these other industries are able to attract people to Oregon despite the fact that average wages are 15 percent less than the national average. . . . Why do people come to Oregon to work for . . . less money? Because of the fringe benefits of clean water, clean air and the incredible beauty, diversity and accessibility of the federal lands, particularly the national forests. . . . The timber industry's attempt to squeeze out every last acre of ancient forest to support a declining industry is doing so at the expense of the rest of Oregon's economy and potential for future growth.
>
> Environmentalists look at the long-term picture, and are motivated by concern for the environment, sustainable lifestyles and a healthy, diverse and livable world for future generations. The corporate timber industry looks at short-term economics, and is motivated by short-term profit, period. If industry cared about local workers, they . . . wouldn't use disinformation to shift the public's attention away from the real problems confronting the wood products industry and the Pacific Northwest's economy, and try to blame these complex issues on the spotted owl and the "environmentalists." . . .
>
> We, as an agency, are perceived by the conservation community as being an advocate of the timber industry's agenda. I also believe, along with many others, that this agency needs to re-take the moral "high ground." . . . We need to be advocates for many of the policies, goals, and solutions proposed by the conservation community. . . . Our mission and goals, as an agency, are much closer to those of the conservation community than to those of the timber industry.

Jeff DeBonis of the Forest Service with a decaying old-growth log.

"Propaganda," fumed A. Troy Reinhart of the Douglas Timber Operators, Inc. in a letter to DeBonis's boss. "Disciplinary actions should be taken against this employee as well as others who undertake this action . . . a formal reprimand is most surely necessary."

A month later, DeBonis sent a seven-page "Dear Dale" letter to F. Dale Robertson, chief of the Forest Service, with copies to a few members of Congress. The letter is from the heart, full of specific examples, and includes suggestions for reforms. To date, Robertson has not replied. (*High Country News,* Box 1090, Paonia, CO 81428, ran the entire letter in its June 5, 1989 issue. $2.25 postpaid.)

Although Forest Service management has quietly advised him he is committing "career suicide," DeBonis is very clear about not wanting to leave the agency to become just one more critic on the outside. "I will . . . tell you what I think we need to do as an agency . . . to move us into the 21st century as *leaders* of a new resource ethic instead of unwilling participants being dragged along by the chain of 9th Circuit Court of Appeals decisions," he says in the letter to Robertson. DeBonis has organized a group, The Association of Forest Service Employees for Environmental Ethics, and has begun putting out a news-

letter, on his own time and with his own computer.

When Martin Luther tacked up those Ninety-five Theses in 1517, he had no intention of leaving the Roman church. He was ticked off by the sale of papal indulgences, which if it happened today would be called SinScam in the headlines — it was a money-for-sin-laundering scheme. The particular indulgence that got Luther mad enough to complain publicly was an indulgence ostensibly to raise money to rebuild the basilica of St. Peter's in Rome, except that half the take from the German churches was being skimmed by the archbishop of Mainz, who had big debts to pay off, after his own rapid rise and the purchase of several ecclesiastical offices.

I have no idea if Jeff DeBonis is a church-going man or not, but he has decided to call his newsletter *Inner Voice.* ■

Inner Voice: $20/year from P. O. Box 45, Vida, OR 97488.

The Fragmented Forest

No land is an island isolated in itself. But each piece of intact land, so-called virgin land, is a lovely locale matrixed in a jigsaw puzzle of humanized habitats. This reality has only recently been addressed. The best forester thinking of "habitat islands" is Larry Harris. This is a book crucial to all conservationists. In my travels in Africa, I dialog with this book. I check out the size and scatter of remaining habitat islands. I note the distances between "good habitat" and ignore political borders. I try to describe the linkages (the drainageways, river crossings, mountain passes, valleys) which might, by acting as safe-passage corridors, increase a herd of elephants' effective home range. I lecture on the need for these corridors and try to reduce the dangers of migration or attempt to soften the contrast between rich habitat and farmland with middle-use buffer zones.

As global warmth and Sahelian drought set in, many animals and plants will try to move away from the changing heat flux. In their way stand cities or monocrops or reservoirs. This too is the reality of the latter half of the twentieth century. If you can't move and it's too hot, you become extinct. ***The Fragmented Forest*** *is by now a classic. You can argue about habitat size and minimal viable populations but you can't argue with its messages.*

(Harris' focus is the Pacific Northwest. An indispensable book for the Oregonian bioregion.) —*Peter Warshall*

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[From the foreword:]
Larry Harris employs the principles of island biogeography and other aspects of biological and ecological science to provide a set of guidelines for rural planning. More specifically, his approach treats patches of old-growth forest as islands in a sea of tree plantations or human-dominated landscape. He details a scheme for surrounding each patch with a low-intensity forest management buffer zone (long-rotation management) and then considers how these long-rotation islands should function as a system, an archipelago. He reasons that many (if not most) species of wildlife will not be secure within any single patch and

The Fragmented Forest
Larry D. Harris, 1984; 211 pp.
$11.95 ($13.70 postpaid) from: University of Chicago Press, 11030 S. Langley Avenue, Chicago, IL 60628; 800/621-2736
(or Whole Earth Access).

therefore movement between patches must be anticipated and planned for. Principles of contour, topography, and energy transformation are invoked to fit the island system to the landscape. The scheme that emerges thus integrates a conservation strategy into a developing or developed landscape.

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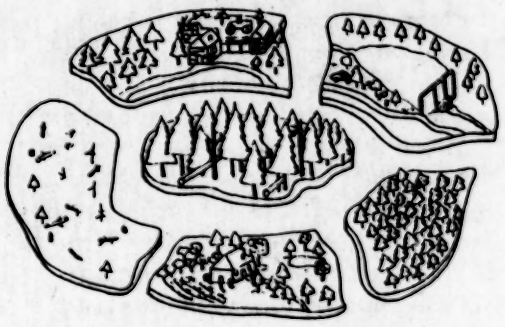
Island biogeography theory predicts that remnant patches of old growth salvaged from much larger, continuous stands will support greater numbers of species than will comparably sized replacement stands developed in isolation from contiguous old-growth forests. This prediction provides incentive to conserve existing old growth rather than depend on the development of replacement stands.



Insularization of old-growth ecosystem patches results from numerous forms of forest management and development.

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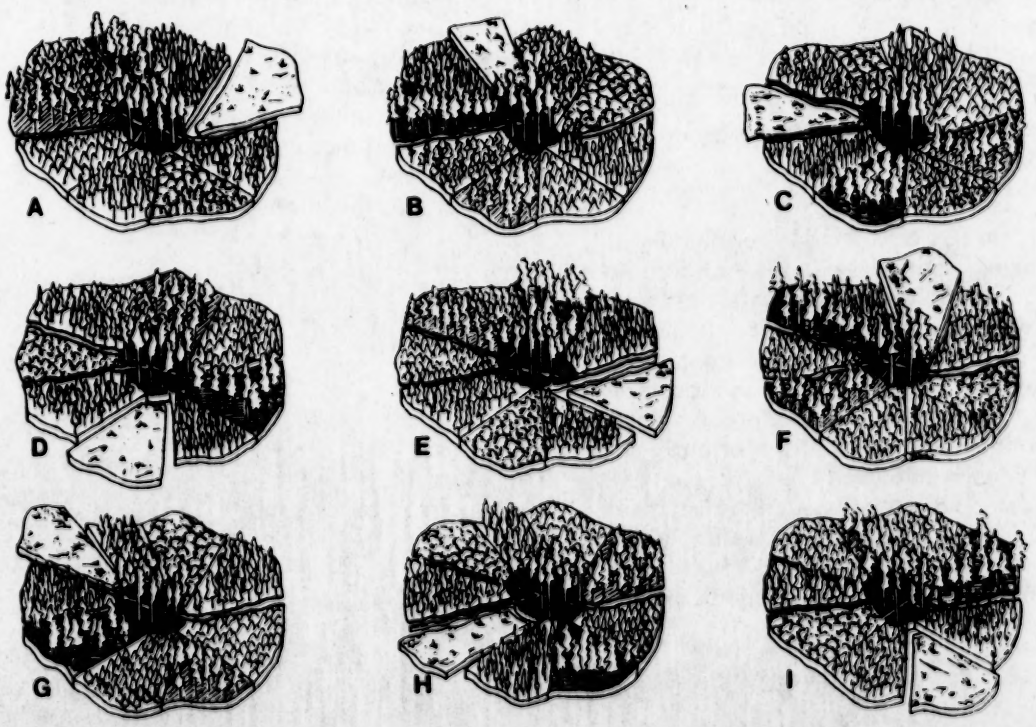
All factors considered, an ideal old-growth area would occur on a moist site containing surface water and a stream. It would contain a topographic bench and a riparian strip dominated by hardwood species. This same riparian strip would connect it with at least two other stands. The site would be at a low elevation with a north or east aspect, but would ideally extend over a ridge top so that the ridge system could be used as a dispersal route and so some sunny, south-facing area would be included. The site would be as far removed from traffic and attendant risks such as wild crown fire as possible. It would be nearly surrounded by replacement stands that can serve as a buffer area and by at least two stands in early stages of growth to provide the full spectrum of successional stages in close proximity.

An old-growth patch surrounded by a long-rotation island that is cut in a programmed sequence.



A Forest Journey

*John Perlin co-authored **A Golden Thread**, a history of the use of solar energy. Like that book, **A Forest Journey** began as an article in this magazine ("Running Out," **CQ** #37, p. 18). Perlin discovered that people historically turned to the sun to heat houses and water only when they ran out of wood. Working backwards, in this new book he looks at wood, from Bronze Age Mesopotamia up to America in the 1880s.*

For that vast span of time wood was the equivalent of oil, natural gas and uranium all rolled into one. Not only did all civilizations heat and cook with it, they also made weapons, wheels (including water wheels that allowed desert agriculture to blossom), merchant ships and navies out of trees. Today we speak of "strategic metals," but formerly it was the forests that were strategic. In this breezy history you can watch empires rise and fall based on who controls the woods, how long they last, who they get traded to and what does or doesn't get built out of them. Trees, it turns out, bear an inverse relationship to civilization, and vanishing forests are as old as the denuded hills.

—Richard Nilsen

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The Venetian government took great pains to ensure the availability of wood and pitch, the materials most needed in shipbuilding. A great many trees from which the Venetians could obtain pitch and timber grew in the Alps above Verona, close to the Adige River, making

A Forest Journey
John Perlin, 1989; 276 pp.
$19.95 postpaid from W. W. Norton, 500 5th Avenue, New York, NY 10110; 212/354-5500 (or Whole Earth Access).

both the pitch and the timber easily transportable to the Arsenal. Venice persuaded authorities at Verona, through which the Adige flowed, to regulate the transport of these two items, forbidding their carriage downstream unless approved by Venetian officials. Venice applied pressure on the Veronese to enact such a statute and the Veronese complied so that "all things may be safe and settled between the community and the Duke of the Venetians," according to officials from Verona. As part of their campaign to conserve easily accessible naval supplies, the Venetian government also prohibited the exportation of wood cut from the foothills and mountains directly north of the city, which could be easily floated down the Piave River. For similar reasons, a decree was passed that set limits to the quantity of wood that could be cut to fuel the glassworks, the principal industry in Venice, and prohibited the glassworkers from burning timber that would be needed for shipbuilding.

Indigenous Peoples and Tropical Forests

You can't separate the plant teachers from the people who use them, and those people are in trouble. Information about the practical value of their way of life has only recently begun to seep out. Cultural Survival is a nonprofit human-rights organization dedicated to raising "public awareness of the human rights of tribal groups and ethnic minorities around the world." Part of this book is a quick course on what is known about indigenous land use. A bibliography of more than 400 separate references on resource management in tropical forests makes this book a resource as well as a good short summary of the research done in this field.

—Howard Rheingold

*[The same outfit publishes **Cultural Survival Quarterly**, a lone, intelligent*

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Forestry policies during the reign of the Commonwealth finished the destructive work begun by the early Stuarts. A survey of forests and woods in England and Ireland demonstrates the grave loss in trees from the time James I took the throne to the crowning of Charles II, a span of less than sixty years. . . .

So many trees were removed in some parts of Ireland that, in [Gerard] Boate's words, "You may travel whole days without seeing any woods or trees. . . ." The destruction was on such a scale that it required the redrawing of Irish maps.

World Deforestation in the Twentieth Century

For beings that spend their entire lives rooted in one place, you'd expect trees to be easier to track. But amazingly, few dependable nationwide tree censuses have been made in the world, and even fewer records of tree removals. A bunch of experts get together in this book and come up with the first sketch of the world's population of tree-beings. It's primarily a scene of depopulation.

Their report is the first vivid panel in the Big Picture of Gaia. —Kevin Kelly

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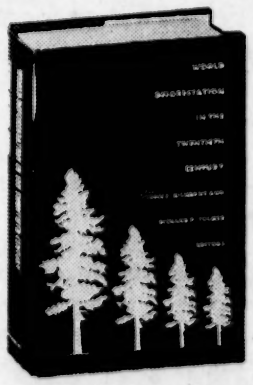
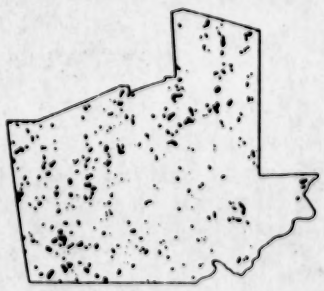
From as early as 1840 farmland was being abandoned in New England and gradually reverting to forest as farmers left lands that were difficult to farm and either moved to better farmland farther west or migrated to urban industrial centers. After 1880 the process began in the mid-Atlantic states of New York, Pennsylvania, and New Jersey, and after 1910 in the east central states of Ohio, Indiana, and West Virginia. In later years the incidence of abandonment spread down into the South as old cotton and tobacco fields reverted to pine forest. . . .

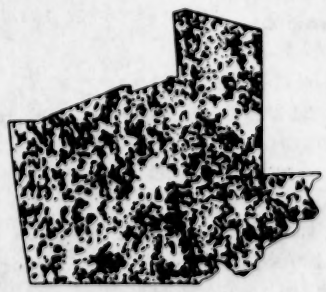
One important reason for our sparse knowledge about the gain in forest land that farm abandonment represented is that abandonment was either ignored or even disapproved. In a society imbued with the frontier ideals of development, progress, and the virtues of forest clearing, abandonment was retrogressive, difficult to comprehend, and even sinful to contemplate. It was something to be ignored tactfully rather than praised blatantly. Although there were hints in the major reports on forestry in the pre-1940s era that reversion was happening, the implications for forest growth were never spelled out.

World Deforestation in the Twentieth Century
John F. Richards and Richard P. Tucker, Editors. 1988; 321 pp.
$15.95 ($17.95 postpaid) from: Duke University Press, Box 6697, College Station, Durham, NC 27708; 919/684-6837 (or Whole Earth Access).





Forest to agricultural



Agricultural to forest

Abandonment of agricultural land to forest and conversion of forest to agricultural land, Carroll County, Georgia, 1937-1974.

voice that, four times a year, disseminates news of endangered human cultures and the ideas they hold. —Kevin Kelly]

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Many indigenous groups clear their plots selectively, recognizing and saving species they find useful. As Denevan et al. (1984) write, "Valuable timber species, such as tropical cedar, are routinely spared during clearing, and various palms and other useful trees are commonly left in or on the edges of newly cleared fields; others may copice and be protected."

Some researchers have found that dispersed garden sites, in contrast to either more intensively utilized fields or untouched tropical rain forests, stimulate the growth of wildlife populations, thus providing a greater abundance of game animals for hunting.

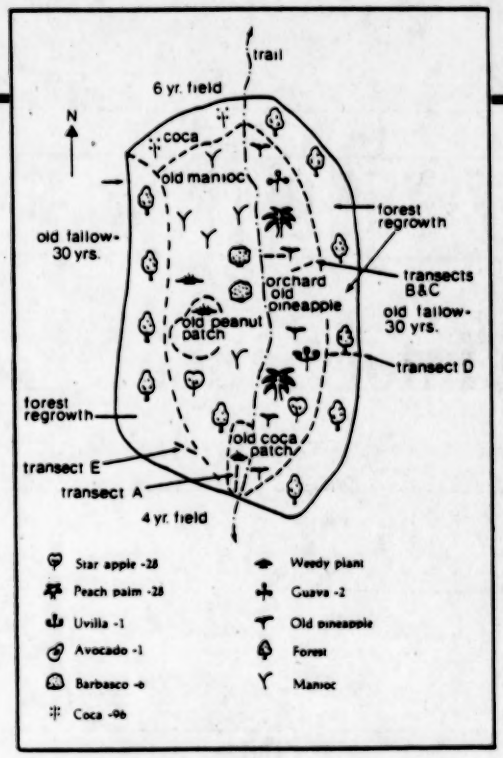
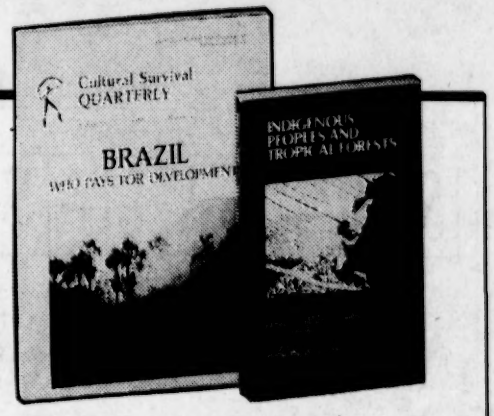


Diagram of five-year-old transitional agricultural plot/fruit orchard of Bora Indians, Peru.



Indigenous Peoples and Tropical Forests
Jason W. Clay, 1988; 116 pp.
$8 ($10 postpaid).

Cultural Survival Quarterly
Jason Clay, Editor
$25/year (4 issues).
Both from:
Cultural Survival, Inc., 11 Divinity Avenue, Cambridge, MA 02138; 617/495-2562.

White Gold

Seringueiros — The Rubber Tappers

BY KAT McKENNA

A long history of violence and mistrust exists among Indians and seringueiros (rubber tappers). Many seringueiros still regard Indians on a par with malaria, snakes and jaguars — dangers of life in the forest. But the seringueiros learned how to live in the forest from the Indians, and today the free seringueiro communities are economically similar to indigenous communities. The rubber tappers and the indigenous communities have overcome considerable differences and past conflicts to come together now in support of the idea of extractive reserves. **—Indigenous Peoples and Tropical Forests**

WITH THE GROWING AWARENESS of the need to protect the rainforests, there come the questions: How best to save them? How to use them? How to protect the livelihood of people who live in the rainforest and depend on it for a living? There exists in the Amazon — in addition to the invasion of cattle ranchers, dam-builders, miners and developers — a gentler stratum of jungle inhabitants who would like to see it protected and yet cannot afford to have it all turned into a park for plants and animals. Many of these people are the native residents, others are settlers or their descendants, scattered along the rivers and throughout the forest. Many of these folks have long harvested the bounty of the rainforest without felling trees.

Rubber-gathering and the collecting of wild fruits and nuts, viable small-scale commercial endeavors, are examples of the human role in this vast natural permacultural community. Tapping a wild *Hevea* tree for rubber neither kills it nor shortens its life. Done seasonally, without clearing or disruption of the ecosystem, the process provides us all with an important resource, while respecting the life of the matrix. *Seringueiros* (rubber tappers) in Brazil maintain that a relationship of respect — harvesting the by-products of the jungle — is what we are seeking and must develop to save the rainforest and the livelihood of all those people who live appropriately within it. Just as tribal people in South America have in recent years traveled to capitals to state their case for preservation before government boards, the *seringueiros* have organized as activists on behalf of rainforest stewardship. The most renowned of these people, Francisco Mendes Filho, president of the rubber tappers' union, brought the issue to world attention before he was murdered by his opposition in December of 1988. He and others lobbied for the establishment of "extraction forests," areas of rainforest uncut in the effort to preserve plant and animal species *and* harmonious human livelihood. Brazil is just beginning to heed this point of view, and has in recent months set aside certain prototype areas for this approach. Cattle ranchers, who have cleared ruthlessly for pasturage, are fighting the shift in priorities. Hopefully, those who were strengthened by the example of Sr. Filho will carry on, and we will see and participate in more folk-activism arising out of the passion of people for their own appropriate place in nature. ■

SOCIAL-SECURITY-NUMBERS

And other telling information: _____

Do NOT write in this space

1) _____

2) _____

BY SIMSON GARFINKEL

Signature _____ **Date** _____

MEG POWERS is a victim of credit fraud. It all started one day when Powers got a telephone call from a jewelry store saying that somebody with her name and her social security number had applied for a store credit card. The store had rejected the application because the address and telephone number on the credit application didn't match those on the credit report they had obtained.

A second store wasn't as thorough and let the woman claiming to be Meg Powers open an account and purchase $1500 worth of jewelry. The store said that "'as long as you get a good credit rating' . . . they don't verify all the information on the credit form," the real Meg Powers reported.

A few weeks later, Powers received in the mail a charge card for Bailey, Banks, and Biddle, what she describes as "a very, very elite jewelry store." Apparently the woman had tried to get another charge plate: fortunately Bailey, Banks, and Biddle had sent the credit card to the address on Powers' credit report, rather than the address on the credit application. As a result of the experience, Powers had to take a day off from work, check with the Department of Motor Vehicles to make sure that nobody had requested a duplicate driver's license in her name, and spend several nights writing letters. Six months later, with copies of police reports, an affidavit from her lawyer, and more than a dozen letters exchanged between her and TRW, one of the nation's largest consumer reporting companies, Meg Powers' credit report still tells of the $1,500 debt to the second jewelry store. The whole thing happened, Powers now believes, because another woman living in the same city discovered Powers' name and social security number and decided to use them as her own. "It's a nightmare that I wish I could forget," Powers says.

Millions of people throughout the country place themselves at risk for similar problems every day by writing their social security number on most checks they pass at retail stores. Merchants nearly always require that a credit card number and driver's license number be written on the check. In most states, a person's driver's license number is their SSN.

The Social Security number is rapidly becoming a de facto national identification number. Credit records are indexed by SSN; some banks and credit unions even use it as an individual's account number. Many universities use it for both student and faculty ID numbers, and many health plans use it to identify their subscribers.

At first, it might seem convenient to have a single number for all of a person's disparate records. One number means just one thing that has to be memorized — a boon in this world, where we are constantly being asked to provide strings of digits for everything from making long-distance telephone calls to getting money out of bank machines.

The danger is that instead of using Social Security numbers as identifiers (or in the place of people's names), businesses in this country are increasingly using them for identification — or proof of identity. Banks, credit-card companies, insurance firms, and healthcare organizations will frequently divulge reams of "confidential" information over the telephone to any voice that speaks a name and Social Security number. If you know somebody's Social Security number, you can effectively invade their privacy or make their life very difficult.

There's a mild level of paranoia being advocated here that once would have put me off but, now that computers have become so cozy, seems like admirable prudence. Simson Garfinkel is a freelance science writer with several degrees in science from MIT, who did his master's thesis in journalism on computerized tenant blacklisting by landlords.

—Kevin Kelly

It is relatively easy to find out a person's Social Security number. Many businesses contract with credit-reporting agencies that can look up a person's SSN given only that person's name and town of residence. Some reporting firms claim up to an 82-percent "hit rate." In 28 states a person's social security number is frequently or always a part of their driver's license; the records of the Department of Motor Vehicles are public, and in most states an individual can be looked up for less than five dollars.

The first, most obvious thing to do with a person's Social Security number is to get their credit history, which can contain information on their bank accounts, credit cards, bankruptcies, and other kinds of information.

"It bothers me that credit reports are being sold by businesses and persons who don't give a damn about the legality of their doing so," says E. A. Fleming, President of Super Bureau, a Californian consumer-reporting firm. "It also bothers me that the right connection can secure personal banking information, unlisted telephone numbers, medical records and numerous other personal records."

Indeed, Fleming's company has access to all kinds of information about consumers, including address verification, driver records, judgment records, change-of-address files, names of neighbors, property records, returned-check registration, Social Security number tracing, telephone number tracing, vehicle records and Californian voter-registration information.

Although the ability to perform a credit check used to be the province of credit-card companies and department stores with their own charge cards, this increasingly competitive industry is now marketing its consumer reports to small businesses and even individuals who extend credit, such as landlords.

Practically anybody with a computer modem and $498 can sign up with the National Credit Information Network, Inc., in Cincinnati, Ohio, which allows instant access to more than 200 million online consumer credit reports, as well as driver's license records from 49 states, and a nationwide telephone and address directory that includes unlisted telephone numbers.

When Michael Grant, a computer specialist in Washington, D.C., decided to purchase a new car, he refused to provide the dealer with his Social Security number because he was paying for the car in cash and felt the information wasn't necessary. Withholding his SSN didn't matter: when Grant visited the dealer to close the sale, he was shown a faxed printout listing all of his credit cards, with

Decoding the Social Security Number

THE FIRST THREE DIGITS of a person's Social Security Number indicate the state that the person was living in at the time that the number was assigned (see table). The exceptions to this rule are numbers in the 700-729 range, which were issued by the Railroad Retirement agency, the only such retirement plan to have its own block of SSNs.

The fourth and fifth digits indicate the group number. The sequence is reported to be odd numbers from 01-09, then even numbers from 10-98, then even numbers 02-08, and finally odd numbers 11-99. All numbers issued before 1965 are either odd numbers between 01 and 09, or even numbers between 10 and 98. The last four digits are the "serial number," and run from 0001 to 9999. The last digit of the Canadian Social Insurance Number (their equivalent of our SSN) is a check digit, determined by a mathematical function applied to the first eight digits. This check digit is primarily designed to detect clerical errors such as transposing two digits or mistaking a "5" for a "6." The American SSN has no such check provisions, and it is for this reason that many observers of the issue of privacy (and at least one federal commission) have declared that the SSN would make a bad choice for a standard universal identifying number in this country.

001-003	New Hampshire	318-361	Illinois	520	Wyoming
004-007	Maine	362-386	Michigan	521-524	Colorado
008-009	Vermont	387-399	Wisconsin	525	New Mexico
010-034	Massachusetts	400-407	Kentucky	585	New Mexico
035-039	Rhode Island	408-415	Tennessee	526-527	Arizona
040-049	Connecticut	416-424	Alabama	528-529	Utah
050-134	New York	425-428	Mississippi	530	Nevada
135-158	New Jersey	587-588	Mississippi	531-539	Washington
159-211	Pennsylvania	429-432	Arkansas	540-544	Oregon
212-220	Maryland	433-439	Louisiana	545-573	California
221-222	Delaware	440-448	Oklahoma	574	Alaska
223-231	Virginia	449-467	Texas	575-576	Hawaii
232-236	West Virginia	468-477	Minnesota	577-579	Washington, DC
232	N. Carolina[1]	478-485	Iowa	580	Virgin Islands
237-246	N. Carolina	486-500	Missouri	580-584	Puerto Rico
247-251	S. Carolina	501-502	N. Dakota	586	Guam
252-260	Georgia	503-504	S. Dakota	586	American Samoa
261-267	Florida	505-508	Nebraska	586	Philippine Islands
589-595	Florida	509-515	Kansas	700-729	Railroad Retirement
268-302	Ohio	516-517	Montana		
303-317	Indiana	518-519	Idaho		

[1]Number 232, with middle digits 30, has been allocated to North Carolina from West Virginia.

their individual limits; at the top of the page was his SSN. "I thought it was pretty interesting that he got all that info on just my name and address," Grant said.

In California, Great Western Savings and Loan allows its customers to telephone the bank's computer and gain access to all sorts of account information, including balances, deposits and checks, by merely entering a person's account number and the first five digits of their SSN.

Many local credit bureaus now offer two services, called Atlas and Trace, which together can provide a person's address and the names of up to five neighbors, all from a name or telephone number. "Basically, what they are doing is taking all this information from credit applications and mailing lists," explains Glen Roberts, who publishes *Full Disclosure*, a newspaper about police activity and citizen's rights. "They are restricted by the Fair Credit Reporting Act from giving out credit information, but they are not restricted from giving out other information, such as telephone numbers and addresses." Roberts says he intends to use such services to verify the identity of people who telephone his newspaper with tips.

Indeed, data banks of personal information, indexed by Social Security number, are increasingly being used for things that have nothing to do with credit or finances — and thus are not covered by what protection the Fair Credit Reporting Act provides (see sidebar).

The Industrial Foundation of America maintains a list of over one million workers, primarily in the South, who have filed Worker's Compensation claims or been injured on the job. For a few dollars, an employer can check a prospective employee against IFA's database. Effectively, the database is a blacklist that keeps workers who have filed claims from finding future employment.

There are now more than a dozen companies who are doing the same thing for landlords. One of the largest, the U.D. Registry, in Van Nuys, CA, has over 2 million tenant records on file, information gleaned from housing-court records and provided by irate landlords. For less than $15, UDR reports to any landlord any eviction proceedings, or statements from former landlords against a given tenant. The effect of UDR has been to blacklist tenants who attempt to exercise their rights; a lawsuit attacking UDR has been pending in California courts for more than two years.

UDR's clients control 90 percent of the rental market in southern California, and the company performs over 250,000 searches per year, according to Harvey Saltz, the company's owner. Saltz says he lets tenants place statements in their files explaining "their side" of the story, but many of UDR's victims aren't even aware of the company's existence. Indeed, some of UDR's most-publicized victims have been people who just happened to match "bad tenants" with similar-sounding names that were in UDR's database.

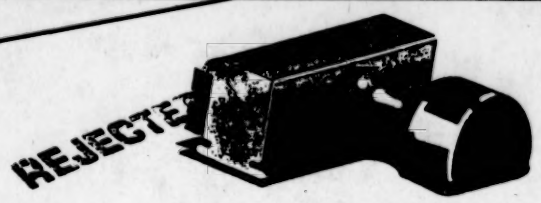
The Registry, another tenant screening service, has a database of a million records for the Washington, D.C. area. Other services operate in Arizona, Colorado, Massachusetts, Minnesota, Missouri, New Jersey, Ohio, Oklahoma, Rhode Island, Texas and Washington. RentCheck, a division of TeleCheck, has files on renters across the country.

Knowing a person's Social Security number gives you control over their life. Since credit-reporting agencies monitor failed applications, simply by filing a spate of bogus credit card applications using that person's name and SSN will make it very difficult for that person to obtain credit in the future. In the event that the credit applications are accepted, you now have a credit card in somebody else's name, which will destroy their credit rating if you use it and do not pay the bill. The Internal Revenue Service will send your refund to anybody who sends in your tax return with your name and your Social Security number. In 1977, an imprisoned felon who was assigned the task of sorting discarded military uniforms took advantage of this fact, and diverted more than 200 refund checks to addresses of his choosing. (The uniforms were labeled with the officers' names and military identification number, which since 1967 have been Social Security numbers, according to *The Privacy Journal*, a newsletter which follows such exploits.)

In another case, a woman in Philadelphia got a letter from the IRS saying that she owed $6,000 in taxes, interest and penalties for an inheritance she had received. The inheritance had actually gone to somebody else who had made up a random Social Security number to avoid paying taxes. "After about six months of hassle, to say the least, she finally convinced the IRS that she did not inherit anything. She was able to do this only because the name did not match the SSN, and the address was in New York instead of her actual address near Philadelphia," says a person familiar with the case.

In California, Florida and New York it is common for illegal aliens to provide made up Social Security numbers when they seek employment. The scrambled earnings records promise to create a nightmare for the number's rightful owner, but sometimes problems show up long before retirement: there is at least one documented case of a woman's unemployment compensation claim being rejected because somebody else was already collecting unemployment on her SSN.

Many companies — utility companies, in particular — will accept knowledge of a person's Social Security number as proof of identity. In Denver, Colorado, a person whose driver's license was stolen received a bill several months later for $400 worth



Fair Credit Reporting

If you've ever applied for a charge account, a personal loan, insurance, or a job, someone is probably keeping a file on you. This file might contain information on how you pay your bills, or whether you've been sued, arrested, or have filed for bankruptcy.

The companies that gather and sell this information are called "Consumer Reporting Agencies," or "CRAs." The most common type of CRA is the credit bureau. The information sold by CRAs to creditors, employers, insurers, and other businesses is called a "consumer report." This generally contains information about where you work and live and about your bill-paying habits.

In 1970, Congress passed the Fair Credit Reporting Act to give consumers specific rights in dealing with CRAs. The Act protects you by requiring credit bureaus to furnish correct and complete information to businesses to use in evaluating your applications for credit, insurance, or a job.

The Federal Trade Commission enforces the Fair Credit Reporting Act. Here are answers to some questions about consumer reports and CRAs:

How do I locate the CRA that has my file?
If your application was denied because of information supplied by a CRA, that agency's name and address must be supplied to you by the company you applied to. Otherwise, you can find the CRA that has your file by calling those listed in the Yellow Pages under "credit" or "credit rating and report." Since more than one CRA may have a file about you, call each one listed until you locate all agencies maintaining you

Do I have the
Yes, if you requ
and, in most ca
you can have y
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In 1970 the U.S. Congress passed the Fair Credit Reporting Act, which gave consumers a number of specific rights when dealing with consumer reporting agencies. Key points of the FCRA include these:

- **The consumer has a right to know of the existence of any personal files.**
- **The right to be told the file's contents and the source of the information.**
- **The right to be told who has received a consumer report within the past six months.**
- **If the consumer disagrees with any information in the file, he or she may force the consumer reporting agency to reinvestigate any information in the file.**
- **If disagreements remain, the consumer may insert a 100-word statement in the file, which must be reported by the reporting agency along with the rest of the file's information.**

Under the FCRA, credit reports can be requested without permission of the person under scrutiny, provided that the request arises out of a credit transaction, a job application, or one for insurance, for a license, or for a "legitimate business need."

The Federal Trade Commission has the responsibility for enforcing the FCRA. The FTC will advise a consumer if it thinks the FCRA has been violated, but it won't take on a case against a credit agency unless it suspects a systematic violation of the law. Basically, says David Grimes, a staff attorney at the FTC, the act gives the consumer the right to sue for violations; the successful outcome of a suit could include attorney's fees, court costs, and punitive damages. Complaints against businesses or questions concerning the FCRA can be sent to the Federal Trade Commission, Washington, D.C. 20580.

Names, addresses and numbers

Super Bureau: 2100 S. Bascom Ave, Suite 5/P. O. Box 368, Campbell, CA 95009; 408-372/6169, 800/541-6821.

National Credit Information Network: 7721 Hamilton Avenue, Cincinnati, OH 45231; 800/242-6246.

The UD Registry:
Van Nuys, CA; 213/873-5014.

The Privacy Journal is a monthly newsletter that follows issues of privacy in the computer age. Annual subscription is $98 per year, although student rates are available.

The Privacy Journal also has published a number of special reports, including *Privacy: How to Protect What's Left of it*, a 338-page paperback with specific guidance for citizens ($7).

The Privacy Journal: P. O. Box 15300, Washington, DC 20003; 202/547-2865.

of utility payments, according to Glen Roberts. The thief had used the stolen SSN to obtain service and, when the bills went unpaid, the utility company had traced the name and the number to find another address to send the bill.

Imagine a clerk at a record store who has had his telephone disconnected for non-payment of bills. All he needs to do is copy the name and SSN from one of the numerous checks that he collects during the day, and he can tell the telephone company that a new person has moved into the apartment. In Massachusetts — as in most other states — a person's name and SSN constitute the only information that the telephone company wants when establishing new service.

Many universities now have computerized registration processes. It's hailed as a boon that lets students dial a telephone number and punch in their SSN and the courses they want to add or drop, all without human intervention. A student whose SSN is public knowledge (perhaps because she passed a check in the student union and somebody works there who doesn't like her) might discover the last day of the semester that all of her courses had been dropped.

INFORMATION collected for one purpose is frequently used for another. Nevertheless, laws proposed to outlaw the use of information for purposes other than which it was provided have never been passed. All indications are that such laws would be unenforceable. Database marketing is currently a $50-billion-a-year industry, with over 20,000 firms in the business, according to a recent article in *U.S. News & World Report*.

To make matters worse, information that is wrong or misleading is often repeated, reinforced and sold from vendor to vendor. Even if the original mistake is tracked down and corrected, it can be nearly impossible to find all the copies — and to persuade the new "owners" of the information to change their records.

The laws and regulatory environment have simply not kept pace with the computer revolution. Information that has traditionally been open to the public — such as eviction filings — takes on a new power when it is gathered in one place and marketed to a specific group of individuals, such as landlords. The Fair Credit Reporting Act was written in a day when consumer reporting agencies were few in number and easily policed: how can its terms be

enforced when credit reports are available to any individual with a personal computer?

Furthermore, it no longer takes a million-dollar computer to run a consumer reporting agency. Landlord Credit Data Services, a Rhode Island tenant-screening service, has a tabletop computer costing less than $20,000 with the names of every person in Massachusetts, Rhode Island, and Connecticut whose name has appeared in a newspaper in connection with a violent crime. Although newspaper accounts are frequently incomplete or inaccurate, no law on any book regulates how LCDS may distribute its information.

What You Can Do

For starters, you don't have to give your Social Security number to everybody who asks you for it. Although certain government agencies are empowered by law to demand your SSN, they are required to state the specific law that grants them that power when they ask you for your number. Private businesses may ask you for you SSN but they cannot legally compel you to provide the number (although, as the Social Security Administration says, private firms are not required to do business with *you*, either.)

The one exception to this rule is in Virginia, where it is unlawful for businesses to require their customers to provide Social Security numbers or to refuse service if the number is not provided, although the impact of this law is lessened by the fact that Virginians' Social Security numbers appear on their driver's licenses.

Although an employer needs to know your Social Security number in order to pay you, you should be suspicious of employers who ask your SSN before you have started working for them. (It should be noted, however, that credit reporting companies are increasingly marketing their services to employers for pre-employment screening.)

Here are a few simple steps that most people can take to protect their privacy and limit their risks of fraud and harassment:

1. Keep your social security number off your driver's license if possible. Several states do not give you a choice about this. In the District of Columbia, Hawaii, Mississippi, Nevada and Virginia, a person's Social Security number is the same as their driver's license number. Further, in Alabama, Indiana, Missouri, New Mexico, North Dakota, Ohio, Rhode Island, South Dakota, West Virginia and Wyoming, the SSN is included on the driver's license in addition to the driver's license number.

In the other states and Puerto Rico, however, the SSN is either optional or does not appear — although some of these other states will happily use your SSN as your driver's license number if you provide it.

In Massachusetts, for example, people have the choice of having their license number be their SSN or a state-assigned "S" number. Although many people in the state do not exercise this option (many don't know about it), an estimated 15 percent of the drivers in the state do. "Basically, people don't want their private information easily available . . . when you are paying with a check," says Diane Turner, a spokeswoman for the Massachusetts Department of Motor Vehicles.

2. Request a statement of your earnings from the Social Security Administration every three years. Misfiled or misreported earnings can be corrected up to three years, three months and fifteen days after the mistake is made, saving you lots of trouble at retirement. Furthermore, getting an earnings statement tells you if somebody else is reporting earnings under your SSN.

To get your statement, you need to fill out a "Request For Earnings and Benefit Estimate Statement" card, which can be ordered by telephone from the Social Security Administration's toll free number, 800-234-5772.

3. If you are rejected for credit, an apartment, a job or insurance because of a credit report, get a copy of that report. If there is invalid information on it, correct it.

If you have been denied credit within the last 30 days, the credit reporting agency is obligated under the FCRA to provide you with a copy of your credit report for free. Otherwise, you will be required to pay $15 for the report. (Three states set the fee lower by law: The credit report costs Maryland residents only $5; $8 for California, and $10 in Connecticut.) The report will include the names of all the businesses that have asked for your report within the past two years and the reason they gave for looking at your file.

Since different consumer reporting agencies keep their own files, you may wish to check with several of them. Two of the largest are TRW (which recently acquired Chilton) and Equifax (formerly Credit Bureau Inc., or CBI.) Their addresses are:

TRW: P. O. Box 5450, Orange, CA 92667; 714/991-5100.
Equifax: 5505 Peachtree Dunwoody, suite 600, Atlanta, GA 30358; 404/252-1134.

If you disagree with anything in your report, the FCRA requires that the credit bureau reinvestigate the facts in dispute. If there is still disagreement after the bureau reinvestigates, you have the right to

insert a statement in your report with your version of the story.

For three years, TRW has been marketing a service that sends consumers a monthly statement of all the businesses that have asked for their credit reports. Called "Credentials," this $35-per-year service also gives individuals access to their own credit report without the $15 charge. According to Jennifer Neu, a TRW spokeswoman, more than 500,000 people have signed up for this service. However, since Credentials gives a consumer no more access to their files then they have under the FCRA, the only reason that a person should subscribe to this service is if they anticipate asking for their credit reports more than twice per year. Make use of your rights: they are your best protection.

4. Be cagey with your Social Security number. While some people, like banks and employers, have a legitimate reason to know your SSN, many other businesses that ask for it haven't. Agencies that collect blood often ask for SSNs from donors, although blood is almost always accepted even if the SSN is not provided. Since blood in this country is screened for HIV and other diseases, the possibility exists that the SSNs of pints that test positive (either rightly or due to false positives) may turn up in databases, either legitimate or clandestine ones.

"Many police departments sponsor burglary-prevention programs by which citizens may label their belongings. Virtually all police departments advise citizens to use their Social Security numbers as identifiers, even though house burglars are precisely the persons one would not want to have one's SSN," writes Robert Smith in *The Privacy Journal's Report on the Collection and Use of Social Security Numbers* (sidebar, preceding page).

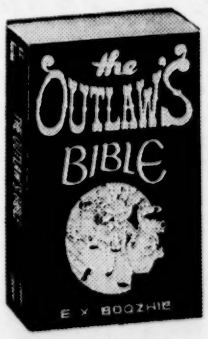
A record store in Rockville, Maryland, had a raffle for free tickets to a movie. In addition to asking for people's name and address, the entry form asked for their SSN. Likewise, some hotel chains ask for SSNs, presumably to track customers and remember their preferences for special services.

5. Lastly, request that companies not use your SSN for account numbers, and when asked for SSN, leave the request blank, if at all possible. When my health-insurance company assigned me my SSN as my account number, I asked them to change it, and they did. At the Massachusetts Institute of Technology, entering students are given the choice of having either their SSN or a randomly assigned number as their student ID. Every organization that uses a different number to keep track of you makes it that much harder for somebody else to use those numbers to gain access to your files or otherwise complicate your life. ■

The Outlaw's Bible

It doesn't take a paranoid personality to see that our freedoms are being nibbled away little by little. What happens when YOU are the nibbled-upon? Hey, you're too pious and upright a citizen to be in that position, right? Never been searched at the border? Never been audited? Never had a traffic ticket? Of course not. But for the non-angels among us, this "jailhouse lawyer" manual can be a handy reference and eye-opener. Even discounting the author's adversarial tone, it's clear that things are not quite as tidy as they seem. Interesting, tasty, and scary. —J. Baldwin

The Outlaw's Bible
E. X. Boozhie, 1988; 323 pp.
$14.95 ($17.95 postpaid) from Loompanics Unlimited, P. O. Box 1197, Port Townsend, WA 98368 (or Whole Earth Access).



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Avoid evoking attention or suspicion in general. For example:

1. *Don't be a walking social statement.* If you're proud to be a member of some special interest or minority group, that's terrific, but leave the costume, song and dance at home. Bikers, cholos, players, gays, nazis, and other such groups all have outspoken enemies who occasionally want to start something. Ordinary, dull, everyday people have no such problems. Look ordinary, and do yourself a favor.

•

Don't talk to police. In the words of Justice Jackson, "any lawyer worth his salt will tell the suspect in no uncertain terms to make no statement to police under any circumstances." Be rude, if necessary. Let them think whatever they want, but no matter what they do or say, don't provide them with your words; they'll find a way to use them against you. The kinds of volunteered statements which must especially be guarded against include:

a. pleasantries and chit-chat.

b. admissions of one's knowledge about facts in a crime.

c. admissions of one's awareness of his rights and responsibilities.

d. remarks which are prompted by ego or emotion.

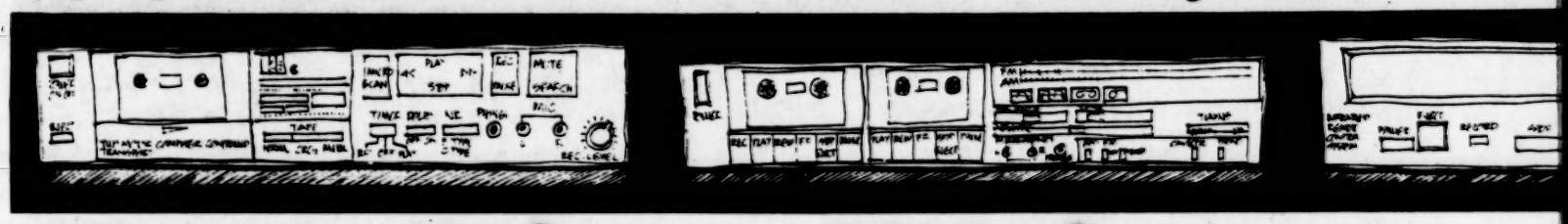
•

You should have legal counsel if you're subpoenaed *as a witness before a grand jury,* even though you aren't charged with anything. There's a good possibility that you soon might be.

•

The easiest way for the police to break through a citizen's expectation of privacy is to get his consent. Once he invites them into his home, his car, or his pockets, he has given them carte blanche to use whatever they may find against him. Once he willingly goes along with them he has voluntarily placed himself under arrest and relieved them of the burden of justifying it. He may not even realize the illegality of items in his possession, or things that he does in the privacy of his home. He might well overlook the insignificant traces left from previous activities that he does know are illegal. In either case, however, the police won't be inhibited from seizing upon such evidence to convict him of a crime; a pistol that he innocently keeps in his glove compartment, or some marijuana seeds in the pile of the carpet, might thus become the unexpected means for a rather harsh lesson in how the system works.

WE HAVE FIVE THINGS IN OUR HOUSE that look something like this:



Our Five Things

TEXT AND ILLUSTRATIONS BY MALCOLM WELLS

One or two are VCRs, the others play cassettes, or discs, or some damned things. All I know is they're hooked up to loudspeakers. I can't tell one box from another.

Our kids gave us most of them so I hate to bad-mouth them but, to tell you the truth, I haven't even touched them. I leave their operation to my wife. She's twice as smart — and twice as patient — as I.

I have a thing against those boxes. It's not for what they do but for what they do for me. If prizes were awarded for arrogance and sadism in design, their designers would get them, as would almost everyone else producing audio-video-computeo devices. Trying to read the tiny words and numbers on their faces is bad enough; trying to understand the words and numbers is worse. What the hell does "gain" mean? Or "tracking?" Or "CD-aux?"

When you unpack one of these boxes do you know what you have to do next? *Read an instruction booklet!* I'm serious. Can you imagine that? And it's not a simple booklet, either. The instructions get worse all the time, and this is said to be the age of information. Useless information, I'd say. Who has time to memorize all that garbage? Has it never occurred to the idiots who produce those things that there's a better way? I think it has. I think they know perfectly well what they're doing, and I don't like what it says about their opinion of me.

I know that the things sell like hotcakes. I know that the people (mostly kids) who use them have no trouble making them work. But I'll be damned if I'll lift a finger to go along with designers whose contempt for me and my time are as great as their designs suggest.

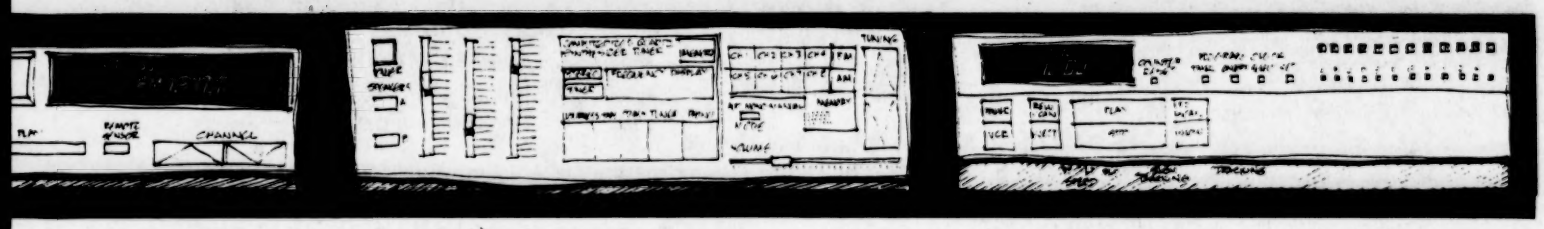
Imagine how nice it would be if instead of having to follow encyclopedic instructions, you opened a carton, pulled out one of those boxes, and found nothing else in the package but a little card on which, in bold letters, were the words PUSH THIS INTO SLOT, THIS END FIRST. The card would not only cause a full course of instructions in glorious sound and color to appear, it would have its own power source so you wouldn't even have to plug the damned thing in first. Too much for a little card-battery, you say? OK, then let the wafer say *1)* Plug unit into wall outlet, then *2)* PUSH THIS CARD INTO SLOT, THIS END FIRST. And of course, on the box, at the slot, there'd be a big label saying THIS IS THE SLOT. (You'd pull the label off later.) Then the animated show would begin, with instructions so graphic, with explanations so simple and appealing, you'd enjoy it as much as a good movie, and remember it as easily.

If that were the only improvement, of course, you'd still have to deal with the unreadable and incomprehensible graphics on the face of the box. But if a new instruction procedure can be imagined, then so can a new operating procedure. Instead of tiny buttons and knobs saying such dumb things as SEARCH and MEMORY, there would be be just one big bright button and a loudness knob. Above the big bright button would be the word OFF. Above the knob: LOUDNESS. When the button was pushed, OFF would change to ON, and a few other big bright words would suddenly appear, each one a choice, each one simply needing a touch in order to be activated. Then, instead of my wife saying, "I wish you knew how to tape 'Roseanne' for me while I'm out. I hate to miss it," she'd say, "Please tape 'Roseanne.' Nine o'clock. OK? Thanks, honey." She'd know I'd finally agreed to join the audiovideocomputeo club.

All I'd have to do would be hit a couple of the big bright words on the boxface, and a recording of "Roseanne" would be as certain as Sunday. TAPE A SHOW?, it would say. (Touch.) TIME? *7:00 7:30 8:00 8:30 9:00* (Touch.) CHANNEL? *5 6 7* (Touch.)

Perhaps the only thing worse than the lack of compassionate architecture in buildings is the woeful absence of architecture in information design, suggests radical architect (the pioneer of underground houses), and troublemaker, Malcolm Wells.

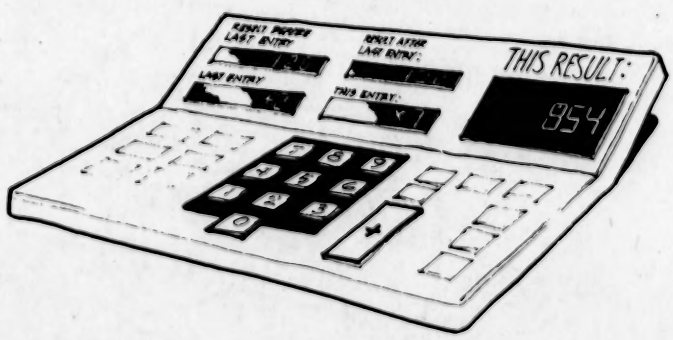
—Kevin Kelly



HOW LONG? *½ HOUR* (Touch.) And finally: I SWEAR TO YOU, MASTER, CHANNEL 7 WILL BE RECORDED TONIGHT, STARTING 9:00 FOR ½ HOUR. I'd give the box a little pat for being so cooperative and it would wait patiently for its chance to serve me.

Not today, though. Even when experts (kids) run the damned things, there's still about one chance in five that the show won't get taped. Something wasn't pushed in far enough, or the tape wasn't rewound, or the connection wasn't right between the TV and the box . . . all of them things that any half-assed computer-age VCR should be able to identify and correct — or warn me of — the minute I gave it the assignment. But no, we're so complacent we let Silicon Valley, or Japan, walk all over us with their slick, cockpit-style designs done in chrome and black and moving dots of light. We practically ask to be stepped on, we're so easily swept away by the look, as opposed to the substance, of convenience.

And take those little hand-held calculators. Miraculous. Answers in an instant — *if* you manage to enter exactly the right figures, and *if* you don't forget where you were. Of course you can get a calculator that leaves a paper trail to confirm your entries but who wants that? Isn't that what the calculator was invented to replace? What if you're called to the phone in the middle of a column of figures? You return and see a subtotal patiently waiting there for you, but what was your last entry? Who knows? So you start over. Then you find that your total doesn't agree with the bank's. Who's right, the bank or you? Chances are it isn't the bank. Then you accidentally touch the C (for clear) button and everything disappears. (Gnash!) Who invented these goddam things, anyway? Someone, obviously, who hates you, someone who goes to bed each night giggling



because he knows how much frustration his design has added to your day. He knows how the calculator should have been designed but that would have brought only peace and joy into your life, and what he wants is to bring you heartburn.

He could simplify your life if he wanted to. He knows how simple it would be to manufacture a calculator that was designed to serve you instead of the other way around. He knows how wildly it would sell, too, how quickly its users would grow to love it. But the joy of sadism dies hard in Microchip Valley. Cruelty prevails. Business booms.

Think I'm exaggerating? Maybe I am — a little. Most of the micronerds I've met have seemed humane. They don't like zoos or chlorofluorocarbons any more than I do. But how else do you explain the results of their design work?

It's the same story with computers, too; and with politicians. The first time they run for office they seem like nice, next-door kinds of people. They capture your confidence. Then you send them to town hall, or the state house, or Washington, and they all become your enemies.

Who is it that wants to dump low-level radioactive wastes without regulation? The Nuclear *Regulatory* Commission, of course. Who lets handguns be sold in spite of 2-to-1 public opinion against them? The United States Congress. Who's on the side of the polluter and the pesticide maker? Why, the Environmental *Protection* Agency. The list goes on and on.

If you think everyone's against you, you're paranoid. If you think everyone in government and industry is against you you're not paranoid. You simply have 20-20 vision. But we are not good voters, not at the polls and not at the cash register, so we have no one to blame but ourselves.

The question is: Is all this worth worrying about? After all, we're demonstrably the richest people in the world. A less-than-perfect stereo component and 6,000 murders by gunshot each year aren't a bad price to pay for the good life. And you don't hear the wild animals complaining about what we're doing to them. Television commercials are done by such gifted people they're a joy to watch. It may be best simply to give in and go with them into the promised land. ■

Primo Levi

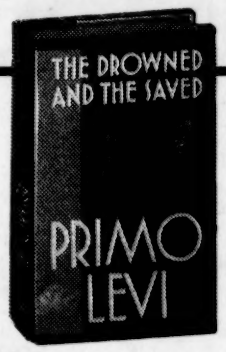
*Longtime readers of **WER** may wonder what their technology/nomadics reviewer is doing dabbling in Holocaust literature, so I'd better explain. I've been interested in the subject for about 35 years, and have probably done more reading on the subject than on any other. Not as a gawker, as if those terrible times were some immense highway accident, but to try and understand how it all came about, and in particular if there was a moment when individuals could have stopped the growing evil. How could six million people be caught like that, and how could a well-educated, highly developed society let it happen? Could the process that permitted such atrocities be the same as that which permits the nurturing of dangerous technologies?*

*It was not until I read Primo Levi's first book, **Survival in Auschwitz**, that I found some answers. Of all the books I've read, only his seem to go beyond the coldly documentary or the intensely personal, to address universal human traits. His writings seem utterly true.*

His narrative is modest and simple, his sensitivity undimmed by the horrors around him. He quietly asserts that the worst thing that happened to him in Auschwitz was when a guard he considered something of a friend casually wiped a soiled hand on his shoulder as if it were a public rag. To Levi, that was worse than the ovens because it symbolized ultimate, thoughtless disrespect for another human being.

Levi is not afraid to say that he collaborated with the Nazis to the extent of agreeing to work as a chemist in a synthetic-rubber factory in return for a life-essential extra liter of soup per day. Few who survived did not cooperate with the oppressors, though fewer still admit doing so.

*Levi followed **Survival in Auschwitz** with a series of books depicting his experiences on the long road home and the rebuilding of his life; **The Reawakening** and **Moments of Reprieve** are wonderfully upbeat and full of human spirit at its rambunctious best. He also addressed technology as a technologist (he was a paint chemist) not only as an integral part of all his books, but directly in his wry and sly **The Monkey's Wrench**. I consider this book to be the sharpest available look at the modern work ethic.*



The Drowned and the Saved
Primo Levi
1986; 203 pp.
$17.25 ($18.75 postpaid) from: Simon & Schuster/Ordering Dept., 200 Old Tappan Road, Old Tappan, NJ 07675; 201/767-5937 (or Whole Earth Access).

***The Drowned and the Saved** is another matter. Dark, terrible, it shows how the Nazis degraded themselves as well as their victims, and how the Nazis and the German people tried, and still try, to pretend they did not realize what was happening. (Our country didn't do much better.) Levi confronts the awful question "Could it happen again? Here? By, and to, us?"*

This really gets to my heart because once, a long time ago, I hired out as a bounty hunter of wolves, with the prize paid by the United States Government. One bright day in Alaska, with a handsome wolf in my sights, I was suddenly struck by the thought that I could very easily — all too easily — be at that very moment a young SS guard drawing a bead on a Jew. Easy to see now, but it wasn't so obvious then. That incident propelled me directly into the environmental movement before there was one. But if I had been a German boy, in 1941, surrounded by fierce nationalism, peer pressure and the Gestapo, would I, could I have reformed? I writhe just thinking about it. The memory keeps me alert. I feel a great fear that the lessons of the Holocaust have not been well learned, and are being trivialized by unrealistic media dramatizations interrupted by commercials.

*The foregoing is, of course, subjective and personal, but I feel safe in recommending all the books of Primo Levi to those of you who have had trouble understanding how a society can go wrong. If you have time for just one, make it **The Drowned and the Saved**. And while you're reading it, remember that Primo Levi, who wrote so eloquently of hope and salvation, committed suicide soon after writing it. —J. Baldwin*

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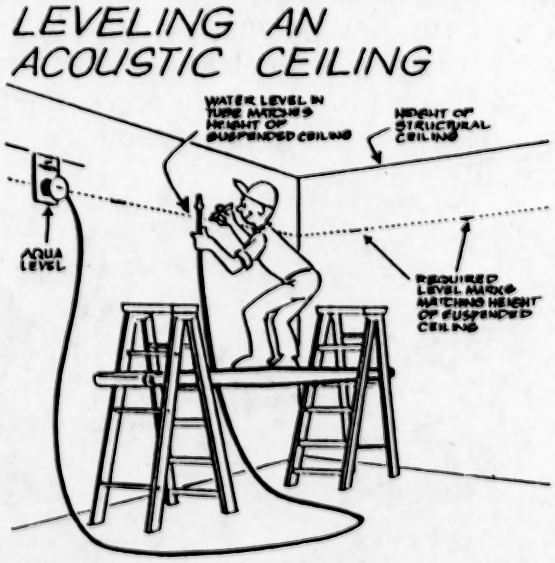
We are often asked, as if our past conferred a prophetic ability upon us, whether Auschwitz will return: whether, that is, other slaughters will take place, unilateral, systematic, mechanized, willed, at a governmental level, perpetrated upon innocent and defenseless populations and legitimized by the doctrine of contempt. Prophets, to our good fortune, we are not, but something can be said. That a similar tragedy, almost ignored in the West, did take place, in Cambodia, in about 1975. That the German slaughter could be set off — and after that feed on itself — out of a desire for servitude and smallness of soul, thanks to the concurrence of a number of factors (the state of war, German technological and organizational perfectionism, Hitler's will and inverted charisma, the lack in Germany of solid democratic roots), not very numerous, each of them indispensable but insufficient if taken singly. These factors can occur again and are already recurring in various parts of the world. The convergence again of all of them within ten or twenty years (there is no sense in speaking of a more remote future) is not very likely but also not impossible.

Aqua-Level

Water levels have been with us a long time. Essentially just a hose full of liquid that seeks the same altitude at either end, the simple and cheap device is at its best at jobs such as getting all parts of a complex foundation just right. Unlike expensive optical equipment, no line-of-sight is necessary — water levels will work fine around corners and through thickets of messy construction.

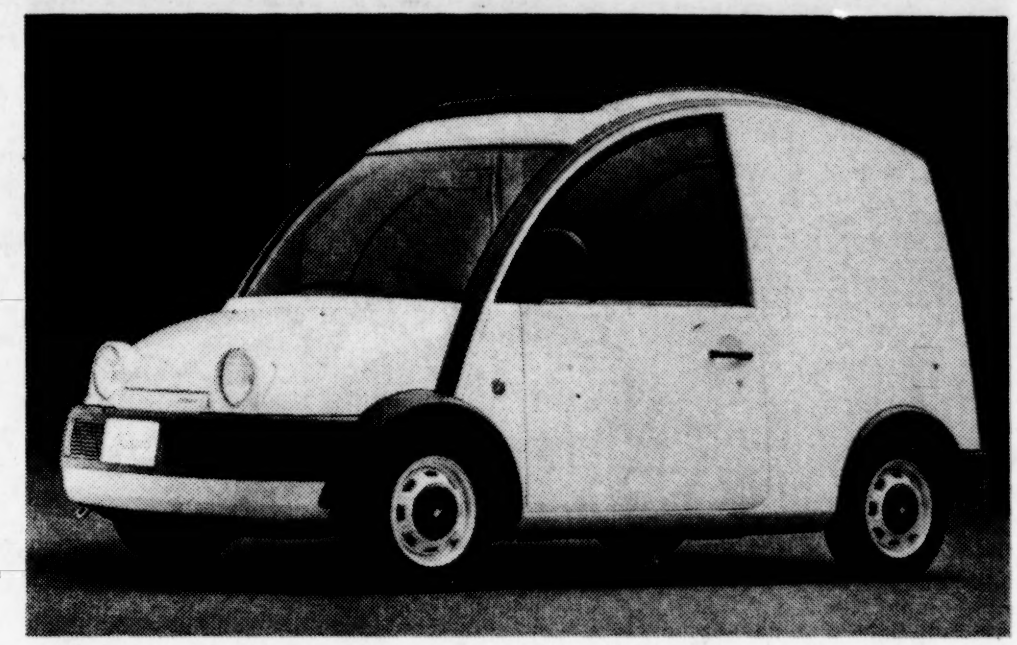
The inconveniences of water levels have been around a long time, too. Any trapped air in the hose will give a false reading, and it is downright maddening to get the ends of a water level exactly in the same place that they were yesterday. The Aqua-Level is the best version yet. Its case has a reading port and a hole for hanging on a nail. The transparent, extra-flexible hose lets you see those bubbles before you're embarrassed, and all 40 feet store on a reel in the case. It works just fine, much better than opaque garden-hose types and the fancy-but-antzy audible peeping models that are very difficult to read exactly. Good idea. —J. Baldwin

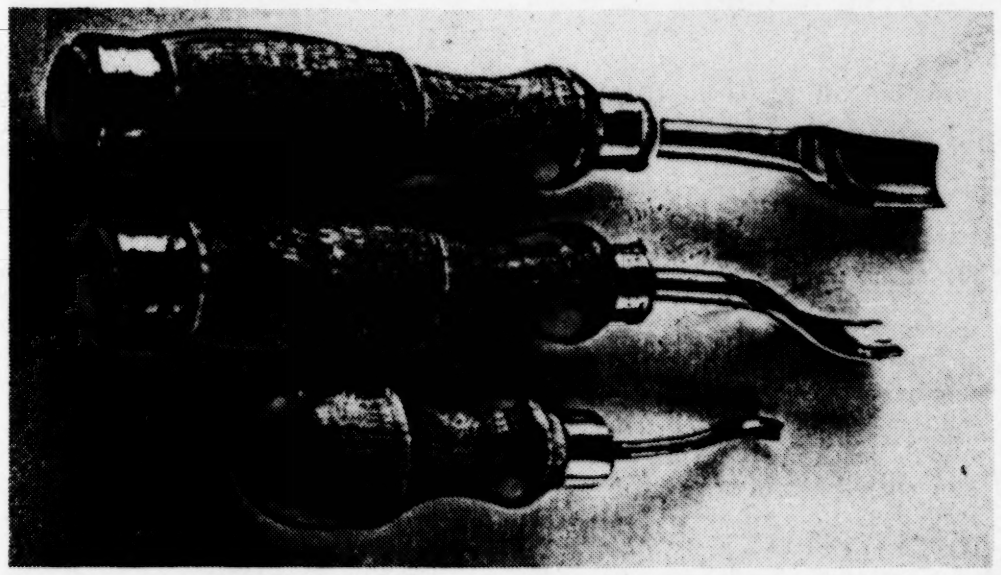
Aqua-Level
$25 postpaid; information **free** from Aqua-Level Mfg. Co., P. O. Box 689, Concrete, WA 98237; 206/853-8933.



Nissan S-Cargo

Nissan sells this little van only in Japan, where traffic conditions already exhibit the congestion we'll be facing soon. It's obviously a marketing experiment to see if the public will go for a machine that is well matched to the realities of everyday driving. Chic replaces macho; mechanical and visual simplicity are actually flaunted. Could this be the harbinger of a new sort of vehicle ethic? I bet these things would sell quite well here despite the joke name, a sly reference to the van's superficial resemblance to the much more clever, but aged, French Citroen 2CV, noted for its slow pace. Rumor has it that the first year's production is already sold out.
—J. Baldwin





Wildfire Tools

For you woodcarving fussbudgets out there who don't consider any store-bought tool to be better than barely adequate, here's a source of hand-made-one-at-a-time woodworking edges. Mr. Lishinsky will also make to order. Prices seem reasonable. I can't personally vouch for his work, but I'll bet he makes great stuff. It's nice to know that there are people who still offer such services. *—J. Baldwin*

Wildfire Tools

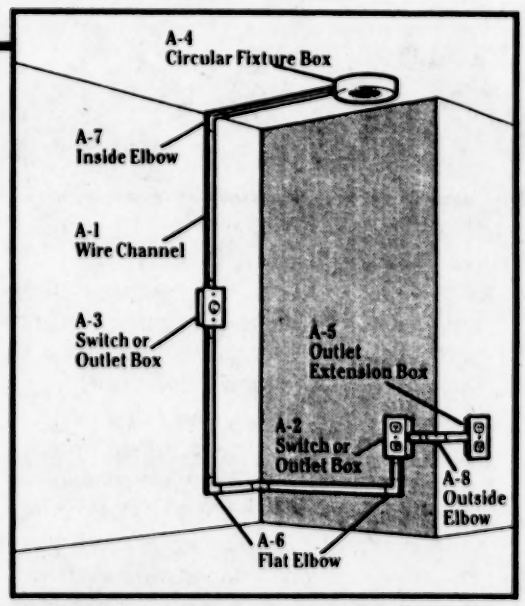
Information **free** from Michael M. Lishinsky, P. O. Box 123, Williams, OR 97544; 503/846-7623.

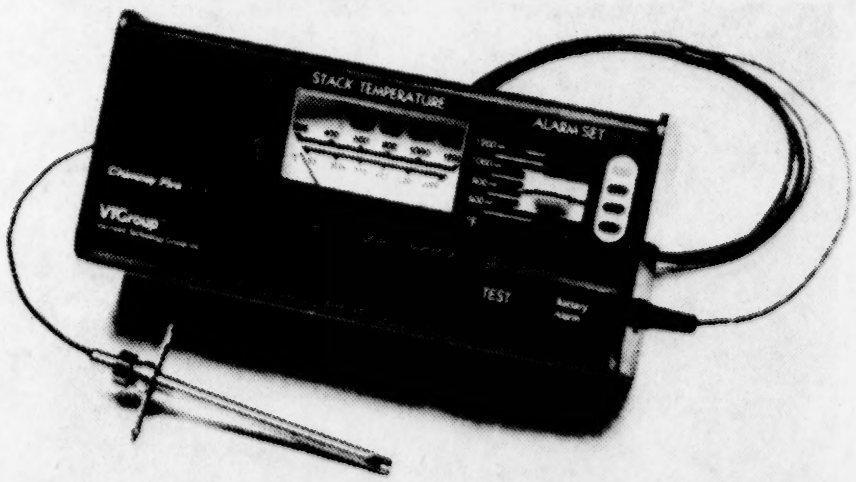
Wiremold

"Basement wiring," my Dad would sneer when he could see anything more than a switch and the appliance controlled thereby. But there are many times when hiding wires is not feasible technically or economically. What to do? Well, you've probably seen the solution: wires run in neat flat tubes along baseboards, up the wall at an unobtrusive place, over to that Casablanca fan in the middle of the ceiling. Electricians charge plenty to do that for you. And they use Wiremold to do it. Used to be only an electrician could buy the stuff. Now you can. It's easy to use by anyone with any sense at all. The directions are complete and well illustrated. The pieces are available in small quantities so you can buy just what you need. No special tools required. Paint it to match when you're done.
—J. Baldwin

Wiremold

$6.99/5' section at local hardware stores; information **free** from The Wiremold Co./Consumer Products Division, 60 Woodlawn Street, West Hartford, CT 06110; 203/233-6251.





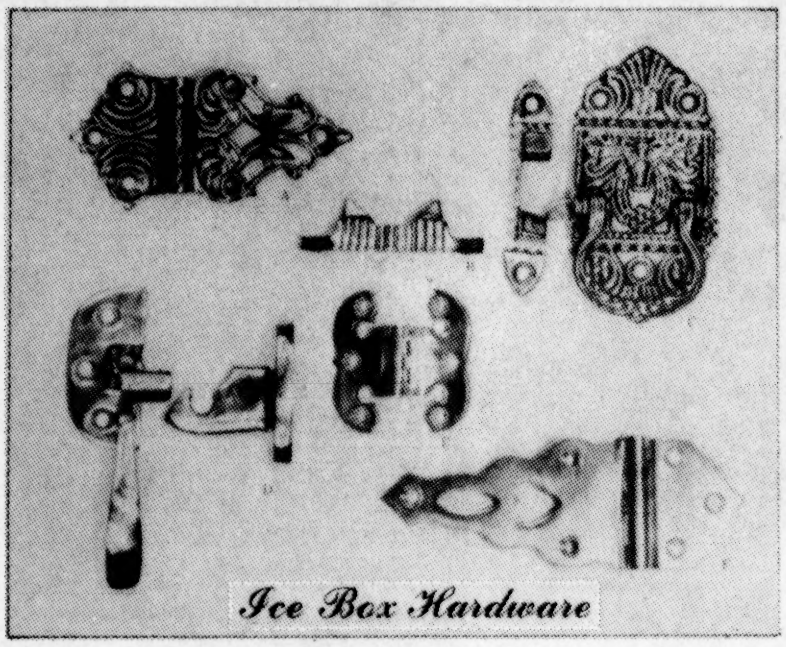
Chimney Fire Alert

If a fire starts in your chimney, this device sounds the alarm. You can also watch the dial to monitor stack temperature — one sure way to check on your firing technique. *—J. Baldwin*

Chimney Fire Alert

$59.95
postpaid from:
Brookwood Systems, Inc.
Coleman Road
Red Creek, NY 13143
315/626-6824

Paxton Hardware



I wouldn't want to be restricted to just one source for furniture hardware. But, if my sources became limited to just a few, I would definitely want to hang on to my Paxton catalogue. Not only do they carry most of the standard items — Chippendale, Queen Anne, Victorian hardware — but they have a selection of quality, hard-to-find Eastlake and French hardware, too. They also supply a wide range of lamp parts, including glass chimneys and shades.

Paxton's hardware is high-quality, reasonably priced, and comes with a 30-day, no-hassle refund policy.
—Stephen Seitz

Paxton Hardware
Catalog **$4** from Paxton Hardware, Ltd., 7818 Bradshaw Road, Upper Falls, MD 21156; 301/592-8505.

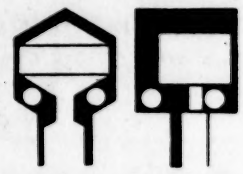
Sampo Ball-Bearing Swivels

Swivels connect anything to anything. For craft work, use Sampo brand (the imported ones don't turn smoothly nor last long).

The difference in the made-in-U.S.A. design is shown in the picture below.
—Hank Roberts

Ball-bearing swivels
$14.67/package (#1). Pamphlet **free** from Sampo, P. O. Box 328, Barneveld, NY 13304; 315/896-2606 (also available from local fishing-tackle suppliers).

BALL-BEARINGS IN TAPERED RACEWAYS
Flat raceways cause shifting, jamming



Frostex II

It's always a surprise to me how many folks have problems with pipes freezing and breaking. The solution has been around for some time now: "heat tape," a thin electric strip heater you apply to the vulnerable pipe or other water hardware. But heat tape has problems, including the possibility of catastrophic and wasteful overheating. It's not recommended for plastic pipe. Frostex, on the other hand, has no temperamental thermostat, can be used anywhere, and is generally well-behaved and thrifty. (Frostex only heats where it's needed, while it's needed; you can even leave it plugged in over summer.) Good stuff.
—J. Baldwin

Frostex II Heating Cable
$1.29/foot; connection kit **$6.99**; information **free** from Raychem Corp./Consumer Products Division, P. O. Box 8036, Redwood City, CA 94063; 415/361-3333.

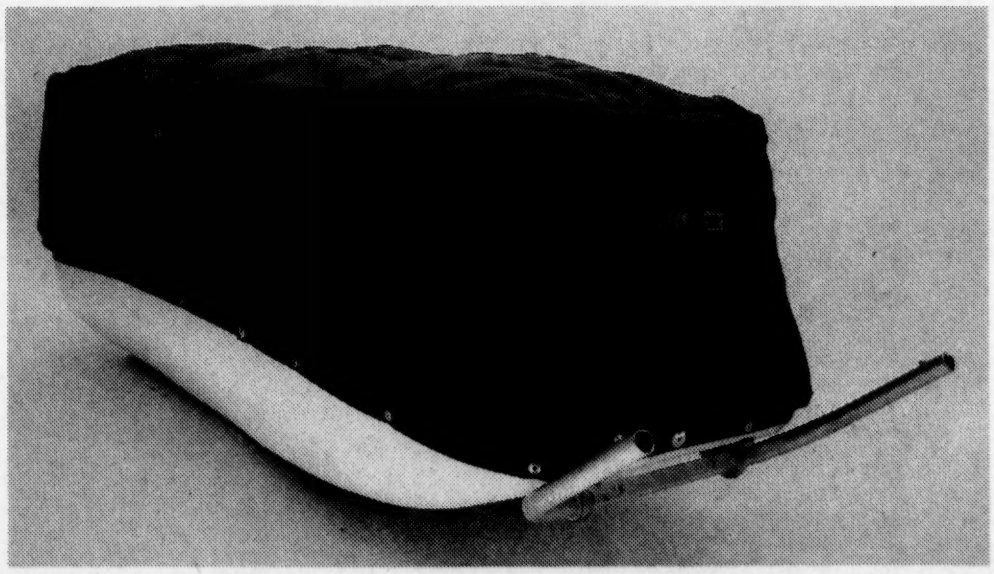
Mountainsmith Sleds

Winter expeditions are one of the truly special experiences available, except . . . how do you carry all the stuff you need? Skiing with 100 lbs. on your back is no fun at all. What the pros do, and what the U.S. Army ski troops do (as I can tell you from experience) is tow a sled. Over most terrain, sleds are much easier than backpacks if your gear (or your kid) weighs more than 40-50 lbs. Sleds can carry 250 lbs. and more. If towing gets to be too much of a chore, add another "motor" — it just takes more harness. Of course, the sled and harness have to be right. Mountainsmith's various models are born of experience and nicely made. They come with a wide variety of accessories including windshields (for human loads), rudders, brakes (without brakes, the people perish!), and dog harness. I've towed one of these things mebbe 2,000 miles, admittedly with some cussing and Burt Lancaster-style gritted teeth. But to be without a sled is unthinkable for an extended stay in the wilderness. There's no other way to do it. *—J. Baldwin*

Mountainsmith Sleds
$180 and up; catalog **free** from Mountainsmith Products, 15866 W. 7th Avenue, Golden, CO 80401; 303/279-5930.

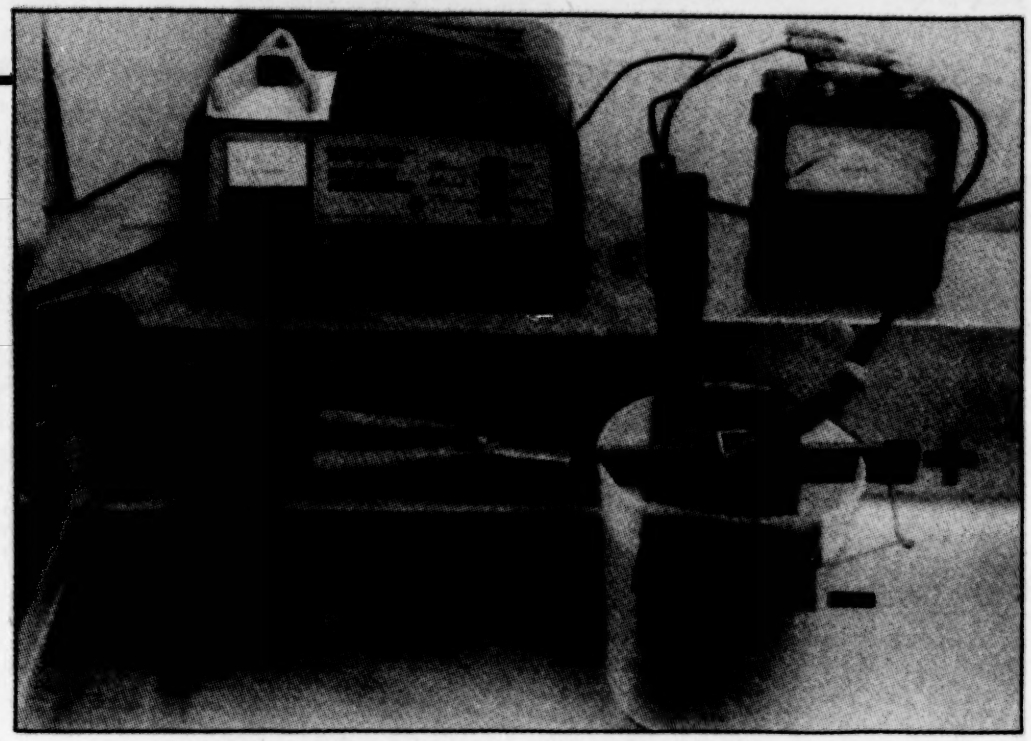
•

Lighter and less expensive than our fiberglass sleds, the Armadillo is made from heavy gauge, high density polyethylene, and is virtually indestructible. The stable, flat "V" bottom is based on the Expedition's proven hull design, but has been shortened and given taller sidewalls to create a high volume sled that is compact enough to strap on your back! A real plus on expeditions where terrain and snow conditions vary widely.



Artists Anodizing Aluminum

Artists? Aluminum? *Well, yes, of course. Why should aluminum be any different than bronze or, for that matter, silver? A look around a handmade-arts store these days will show that the metal is enjoying a new popularity in jewelry, sculpture and a variety of imaginative tableware. This handbook is a complete instruction for coloring aluminum, and you'd be surprised at what subtle things can be done. As part of a developing tradition rather than serving an established one, the book is revealing, funky (you can do the deed with a battery charger and a deep-fat fryer!), and friendly — just what you'd expect from a master craftsman who got tired of answering questions, yet wanted to share his bench-won knowledge. There's a good bibliography, glossary, materials source list and safety discussion (there are toxic substances involved). Exciting and professional.* —J. Baldwin



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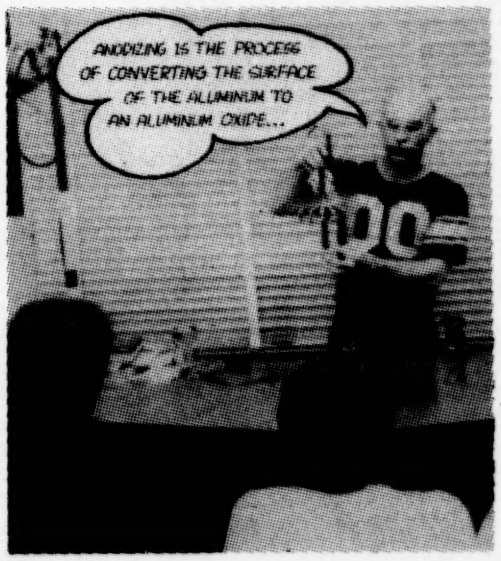
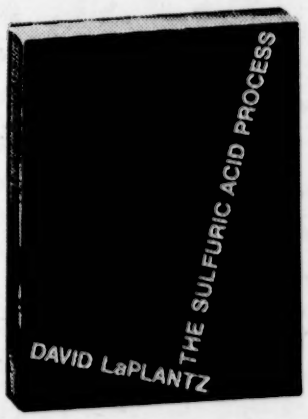
This is a simple anodizing set-up. The battery charger is located in the back left with the ammeter to the right. The ammeter is wired in series with the positive electrode. The 1 quart plastic container in the front contains the sulfuric acid/water electrolyte and has 2 lead cathodes. A 10-12 gauge copper wire (equal to the maximum amperage of the power supply, 10 amps = 12 gauge wire) connects the 2 lead cathodes together. The bus bar is ¼" thick X 1" wide X 8" long. Black electrician's tape covers the right end of the bus bar. This tape build-up prevents the bus bar from falling into the electrolyte. The positive clamp from the battery charger is attached to one end of the bus bar, while the negative clamp is attached to the lead sheet (negative electrode). An extruded aluminum angle is clamped to the bus bar with a spring clamp. A clamp may be the most obvious method to attach the work piece to the bus bar. To anodize large strips or sheet, simply clamp the aluminum to the bus bar. Clean the bus bar before each anodizing. Clean the bus bar with scotch bright and water. Do this cleaning in the sink away from the electrolyte to minimize contamination.



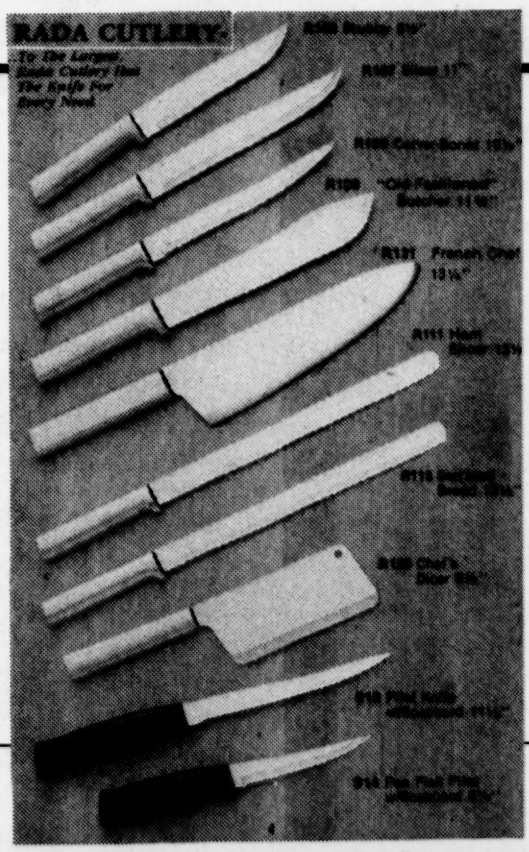


Artists Anodizing Aluminum
David LaPlantz, 1988; 199 pp.
$19.95 postpaid from Press de LaPlantz, Inc., P. O. Box 220, Bayside, CA 95524 (or Whole Earth Access).

Rada Cutlery

After peering into a locked case of kitchen knives all marked $39.50 each at a department store, I decided to pursue a different route: aluminum-handled knives. My first aluminum-handled paring knife appeared mysteriously in our kitchen drawer shortly after a faculty picnic, but we never knew who owned it. Soon we were not too eager to find out, as it became the Knife of Choice . . . but then we also realized that we didn't know how to get another. Last summer at a flea market we found the man selling them, and I abstracted the maker's address from a box (there is no mark on the knives themselves).

The makers offer a lifetime guarantee after being in business for 40 years or more, but since their name is not on the knives it may be difficult to locate them, as it was for me. —Kelly Yeaton



[These folks do not sell to individuals. Their main customers are groups selling Rada cutlery for fundraising. Minimum order is one dozen of an item. —KK*]*

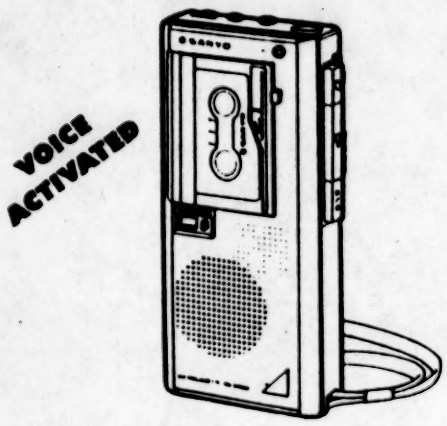
Rada Cutlery
Catalog **free** from Rada Mfg. Co., P. O. Box 838, Waverly, IA 50677; 319/352-5454 (or Whole Earth Access).

•

R106 Stubby Butcher	2.25
R107 Slicer (11")	2.30
R108 Carver/Boner	2.35
R109 "Old-Fashioned" Butcher	3.80
R110 Carving Fork	2.35
R111 Ham Slicer	3.30
R112 Bread Knife	3.30

SANYO

MICROCASSETTE MODEL M 5490



Sale Price $65.00

2-Speed Microcassette Recorder with quick record/Quick review

- Voice-Activated Recording
- Full Silent Stop
- 3-Digit Tape Counter
- Quick Record/Quick Review
- Operates on 2 'AA' Batteries (not included) or from supplied AC Adapter
- Automatic Level Control
- Cue and Review
- Condenser Microphone
- Battery life Indicator
- Earphone

Martel Electronics, Inc.

My search for a real cassette-tape transcriber, one that automatically backs up the tape and replays the last bit when you pause so you don't miss a word, and maybe even has variable speed so you can slow the tape down to your typing speed, led me to Martel's catalog. They have an overwhelming collection of mini-, micro-, and standard cassette recorders, transcribers, dictation machines, multiple-speed players and nifty equipment for people like me interested in taking notes rather than recording music. Good prices too. —Kevin Kelly

Martel Electronics, Inc.
Catalog **$2** from Martel Electronics, Inc., 920-A E. Orangethorpe, Anaheim, CA 92801; 800/553-5536 (in CA: 800/331-5231).

1-7/8 ips plus low speed 15/16 ips for twice the normal tape time capacity

Answering Machine Specialty

*In your review of "Real Goods" [**WER** #60, p. 59], you show a telephone answering machine which works on 12V at a pretty steep price. We bought a Panasonic answering machine this spring from Answering Machine Specialty. We paid $100 and are well satisfied. It plugs directly into our deep-cycle battery and has more than enough whistles and bells. For comparison, these folks sell the machine you advertised @ $289.95 for $239.95. They also informed us that ALL Panasonic answering machines will work directly off 12V power. They've been very helpful & free with their advice.*
—Marianne Edain

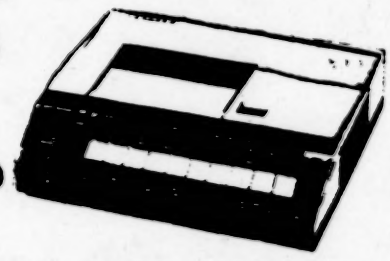
Answering Machine Specialty
Catalog **free** from 36800 S.E. Proctor Road, Boring, OR 97009; 800/222-7773.

SANYO
TWO SPEED.

Model 9010 Transcriber

Your Cost **$299.00**

- Solenoid Transport Controls
- Auto-Search for Cue Tone
- Time-Saving Quick Erase
- Foot control W/Play and Variable Back-Space
- Variable Playback Speed



Uses Standard Cassettes

Archival Quality Materials

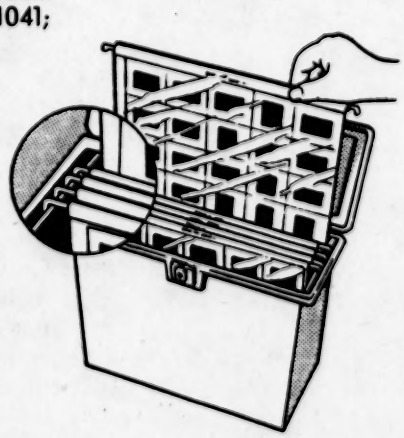
This is the Fountain of Youth for information containers, particularly paper. If preserved properly, paper memory has proven reliable for thousands of years. Available in this catalog are highly evolved implements and processes of archiving, tested over many centuries in museums and libraries. These will slow the corrosion of time on your slides, photographs, paper documents, and film. They even sell archival-quality xerox paper — the ephemeral made everlasting. —Kevin Kelly

Archival Quality Materials
Catalog **free** from University Products Inc., P. O. Box 101/South Canal Street, Holyoke, MA 01041; 800/628-1912.

Portable File

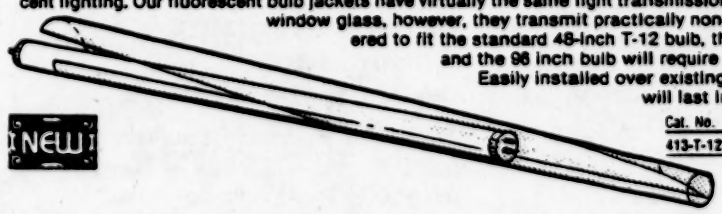
Constructed of durable polypropylene construction, with lock & handle. Stackable, each file holds up to 150 pages hanging with Perma-Saf™ bars. Hanger rails are molded into the design. Beige only. Dimensions 12" x 9½" x 9½".

Cat. No.	Price Each
466-ESShf	$16.25

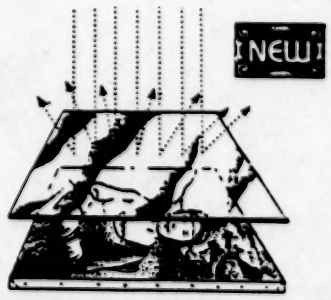


UV Fluorescent Light Filters

Protect your displays & storage area from the fading, bleaching and deterioration caused by the ultraviolet light from fluorescent lighting. Our fluorescent bulb jackets have virtually the same light transmission in the visible light spectrum as ordinary window glass, however, they transmit practically none of the harmful ultraviolet light. Engineered to fit the standard 48-inch T-12 bulb, the 24 inch bulb requires only ½ of a unit and the 96 inch bulb will require 2 units (standard unit also fits T-8 tube). Easily installed over existing or new flourescent bulbs, these jackets will last indefinitely. Sold in packages of 12 units.



Cat. No.	1	2	5 or more
413-T-12	$36.00/pkg.	$30.00/pkg.	$25.00/pkg.



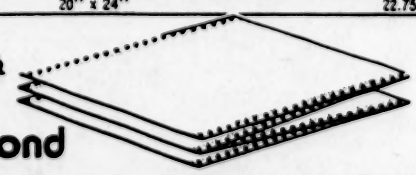
Ultraviolet Filtering Plexiglas®

Ultraviolet light will cause fading and deterioration of photographs, documents, and valuable works of art. Plexi Glas UF-3 sheet is specifically formulated to filter out 92% of this harmful ultraviolet radiation. The sheet can be installed as a shield for the source of the light as a window cover, skylight, etc. or it can be used in place of picture frame glass or display case glass. Sheets are approx. ⅛" thick and have a slightly yellowish tinge.

Cat. No.	Size	Price/Sheet
422-0810	8" x 10"	$ 3.35
422-1114	11" x 14"	6.95
422-1417	14" x 17"	10.95
422-1418	14" x 18"	11.70
422-1620	16" x 20"	14.90
*422-2024	20" x 24"	22.75

For Impact Printers & Word Processors

Perma/Dur® Bond



Continuous Perma/Dur® Archival Quality Watermarked Bond Paper is for use in Word Processors and Pinfeed Printers. Ideal for thesis, books, etc., where longevity and durability are important. Perforated on all sides, edges and between pages with our new "Smooth Perf" process assuring an absolutely clean edge. Sheet width is 8½" (216mm), overall width is 9½" (241mm), perforated every 11" (279mm).

Cat. No.	Quantity	Price/Box
901-0150	Box of 150 sheets	$12.95
901-0500	Box of 500 sheets	24.95

Running A One-Person Business

Quite often, the best advice a small business can get turns out to be common-sense dime-store wisdom, stuff you already know instinctively but somehow need to hear from someone else to learn that you can trust your own judgment. Salli Rasberry, Michael Phillips and friends have been writing this kind of friendly advice for years (previous books are ***Honest Business*** *and* ***Marketing Without Advertising****). This book covers some new territory: time management, home offices, setting and living within budgets, hiring (or not hiring) help, keeping your sanity, enjoying your work. A little bit of everything, all of it helpful.*

—Bear Kamoroff

•

Focus on Doing Just One Business

The rule about doing just one business seems obvious but is ignored. It seems obvious because it is difficult enough to master a single business. It is ignored, especially by newer businesses, because of the tendency to try to do anything for anybody as long as you're paid for it, and whether or not it's appropriate to the business you're trying to define. Start-up businesses often have to spend considerable time defining their product or service in a focused way that is easy for others to understand. Yet this is the way to continue to receive a stable flow of referrals as the business grows and matures.

•

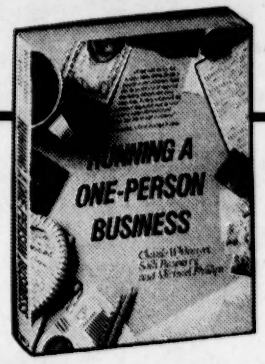
You are on trial as a good example. To expect an employee to do good work, you have to set a good example by constantly working hard. This forces you to give up the greatest advantage of a one-person business: flexible time. If you decide to spend the morning reading back issues of trade journals or taking a walk in the park, what do you think the employee is going to conclude about working habits? With an employee, being able to goof off from time to time or to set your own schedule could become a thing of the past.

•

Referring work to others can be a touchy subject for a one-person business. Insecurity creeps in. What if the person you recommend is more appropriate for your client? What if he or she does a bad job, and not only do you lose the client but word gets around that you are not very professional?

You can do little about the first problem of losing a client except presume that you will also inherit clients from referrals. Console yourself with the thought that the change of clients would eventually have happened anyway if the match with your substitute was really more appropriate. As in any relationship, holding on isn't worth the energy if the other person isn't interested.

Most of the businesses we have worked with find that better than eighty percent of the clients they refer elsewhere in emergencies return to them. Given this figure and considering that you might lose clients anyway if you don't make referrals when you can't handle the work, you might as well take the plunge. With experience will come the confidence and knowledge that you really are the best choice for certain clients.



Running a One-Person Business
Claude Whitmyer, Salli Rasberry and Michael Phillips, 1989; 204 pp.

$12 ($13.25 postpaid) from:
Ten Speed Press, P. O. Box 7123, Berkeley, CA 94707; 415/845-8414 (or Whole Earth Access).

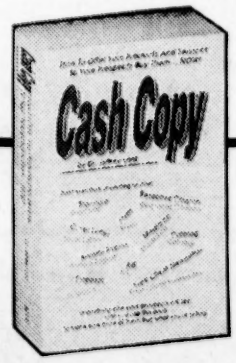
Cash Copy

This book is subtitled "How to Offer Your Products And Services So Your Prospects Buy Them . . . NOW!," and further subtitled "Don't Even Think Of Creating Another Brochure, Response Coupon, Flyer, Cover Letter, Annual Report, Media Kit, Catalog, Ad, Proposal, Free Client Newsletter, Or Anything Else Your Prospects Will See, Until You Use This Book To Make Sure More Of Them Buy What You're Selling."

It's a 6" x 9", 470-page, expensive paperback, full of POW! ZAP! on how to write aggressive, go-get-em ad copy to convince people to buy what you have to sell — right now, pick up the phone and dial 800-328-7448, you need this stuff. *Well, anyway, the book is well written and the advice is accurate. If you are already running a mail-order business, this book could well help you with your ad copy. —Bear Kamoroff*

•

If you want your prospects to trust you sufficiently even to ask for more information, much less to entrust you with their hard-earned money, then you have got to give them the clear feeling you are totally, entirely, completely and profoundly dedicated to their achieving their objectives and that you will do what is necessary — *whatever is necessary* — to guarantee their satisfaction.



Cash Copy
Dr. Jeffrey Lant, 1989; 480 pp.

$24.95 ($27.95 postpaid) from:
JLA Publications, 50 Follen Street/ Ste. 507, Cambridge, MA 02138; 617/547-6372 (or Whole Earth Access).

But merely writing these words on a page is insufficient. Your business and its practices must exemplify these words. For if they are just words . . . and not your constant business practices . . . you will fail. Oh, some smart copywriter can make mere words work for you for some period of time. But as the truth comes out that you don't mean them, your prospects and customers will dismiss them — and everything else you say — as lies and humbug, nothing but words. Instead of the constructive client-centered practices on which a successful business must be based.

•

Here is how a Cash Copy Letter should open:

> Immediate benefit to you for letting me help you.

Attributed testimonial from someone like you who has successfully benefited by using my services.

Dear you,

Here's a terrible problem you are facing.
Here's a raging desire you want to achieve.
Here's a want you are obsessed about.

Here, in short, is something very definitely about you. You. You.

•

Egregious Error #2. You Think Your Prospects Are As Interested In What You're Selling As You Are. . . .

Your prospects are not interested in your products or services. They are interested only in themselves, in their (all too often) petty aspirations, flawed desires, crack-brained anxieties and foolish fears. Thus it is to these — not the manifest wonders of your product or service — that you must appeal.

•

Do you get everything that people tell you the first time, even if it's for your own good? Of course not. And neither do your prospects. Which is why you must restate your benefits.

You are not obliged to use a single benefit just once and never use it again. You *are* obliged to get the prospect to take action. And either you have sufficient benefits to do that . . . or you must reuse, that is restate, your benefits so that he does.

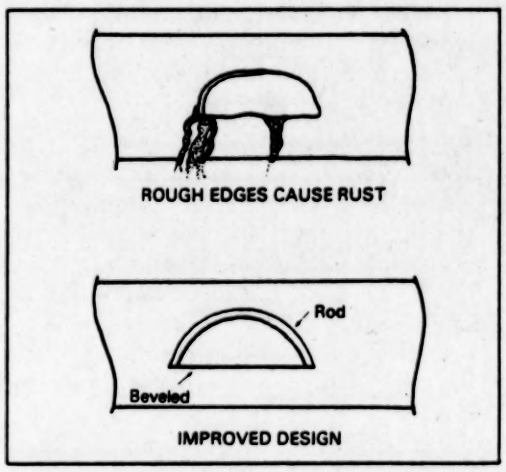
Steel Away

I've been planning on getting a steel boat and heading for the horizon for a while now. This book has helped me look at this dream realistically. I'd recommend it to anyone who shares the dream, whether they're thinking of a boat made of steel, fiberglass, or wood. Heck, the 20-page appendix on the cost of systems and materials is worth the price of the book, as is the directory of designers and builders working in steel. A quote from the introduction:

"It's a volume about the virtues of planning ahead so that you have the time and information to choose correctly. It's a collection of ideas with the final decisions left up to you . . . the emphasis is on providing information to help anyone organize a logical plan to obtain and outfit a steel boat."

The book does that. It is 432 pages long, and there are well over a hundred photos and around 200 technical illustrations. This book gives access to the tools, both physical and mental, that you need for working on this particular dream. —*Flash Gordon*

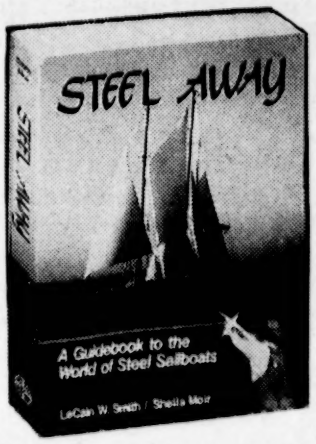
This homemade plate roller is powered by a tractor, leaving the builder free to guide the plate through.



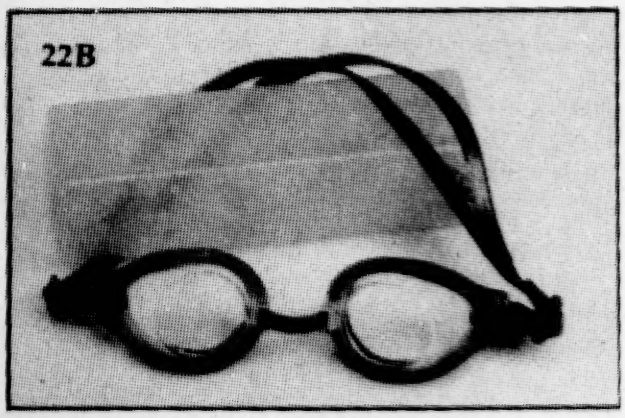
The sign of a corrosion-free boat is that small details, like the correct finishing of scupper drains, get careful attention.

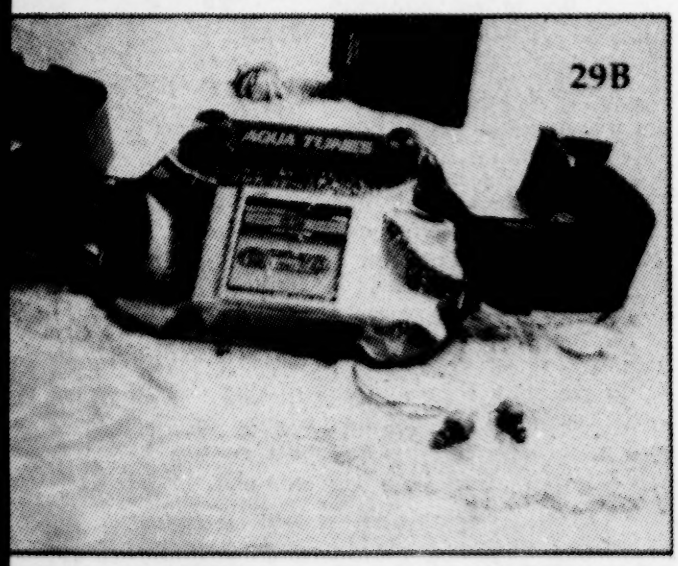
Steel Away
LeCain W. Smith and Sheila Mohr
1986; 431 pp.

$24 ($25.85 postpaid) from: Windrose Publications, P. O. Box 619, Port Townsend, WA 98368; 206/385-5053



- Steel should never be joined directly to any other metal except by welding, and, with other metals like stainless steel, this should only be done above the waterline. Nickel, tin, lead, or soft solders in contact with steel will almost guarantee corrosion. If more noble metals that can't be welded to steel (like bronze) are used, they must be fastened mechanically with bolts or studs that have been properly insulated.





World Wide Aquatics

Swimming supplies are often hard to find out of season. World Wide Aquatics offers a catalog with dozens of styles of goggles, caps, and competition suits. They also sell training aids, snorkels and fins, pool equipment, and books. The products include a waterproof belt, so that you can listen to your personal stereo while swimming laps.

—*Joel M. Lee*

World Wide Aquatics
Catalog **free** from World Wide Aquatics, 509 Wyoming Avenue, Cincinnati, OH 45215; 800/543-4459.

NEW!

22B — Prescription Goggles with Anti-fog lens by Swans

Hi-tech, anti-fog correction lens for near-sighted athletes. These goggles have excellent vision polycarbonate lens and are to be used for sports use only. Double band. Prescriptions: -2.00, -2.50, -3.00, -3.50, -4.00, -4.50, -5.00, -5.50, -6.00
SW7AF **$40.00**

29B — Aqua Tunes Watersport Belt

As featured in Sports Illustrated. *Comfortable belt with see-thru pouch to hold a radio or cassette player. Enjoy all water sports while listening to your favorite music. Watertight clamp on pouch keeps stereo dry, while waterproof earphones keep music high. Adjustable waist buckle. Cassette player or radio not included.*
ATWSB **$39.95**

Neoprene Shoe Covers

Think of them as galoshes for bicyclists. Made from the same material as skin divers' wet suits, these should keep your feet warm in even the foulest weather. Designed to pull over the shoe, they are cut a bit like cycling shoes — which means that they come narrow. They work with cleated or non-cleated shoes; simply cut a hole in the bottom if you use cleats. —*Richard Lovett*

They look funny, but they work.
—*J. Baldwin*

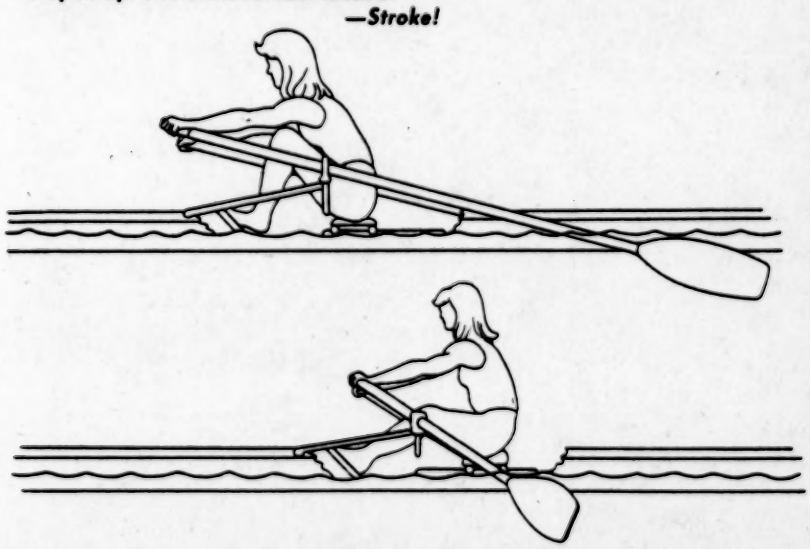
Neoprene Shoe Covers
$26.45 postpaid from: Performance Bicycle Shop, P. O. Box 2741, Chapel Hill, NC 27514; 800/334-5471.

Stroke! • Long Strokes

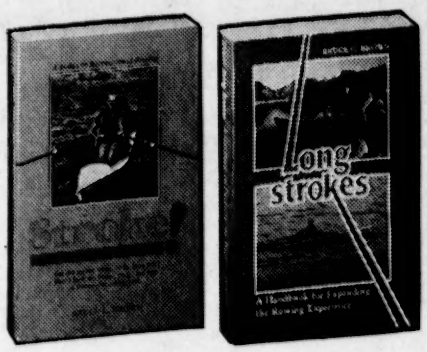
These books are an introduction to recreational rowing. The sliding-seat-equipped craft float somewhere between clunky park rental rowboats and the effete, needly, you'd-better-part-your-hair-in-the-middle-if-you-don't-want-to-swim racing shells. ***Stroke!*** *is about the equipment, form and technique, and health benefits.* ***Long Strokes****, with some overlap (so to speak), attends the joys and intricacies of extended trips along coasts. Of course you can indulge in any river or lake big enough to accommodate the distance-eating habits of the graceful boats. Tempting indeed, and perhaps the most satisfying aerobic exercise available. —J. Baldwin*

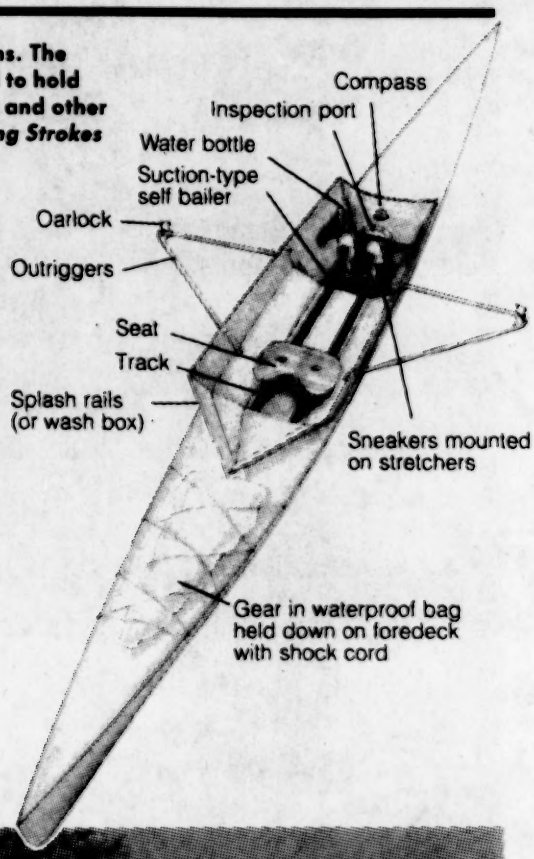
At the catch, the arms are straight and locked, the body bent forward, the knees compressed, and the heels raised.

As the legs come down, the back just begins to open up. The arms remain locked.
—Stroke!



An open-water shell with custom modifications. The screw-in lid of the inspection port can be used to hold captive a plastic bag containing keys, wallet, and other valuables. ***—Long Strokes***





Stroke!
Bruce C. Brown, 1986; 148 pp.

Long Strokes
Bruce C. Brown, 1988; 176 pp.

$14.95 each (postpaid) from:
TAB Books, Inc., Blue Ridge Summit, PA 17294; 800/822-8158
(or Whole Earth Access).

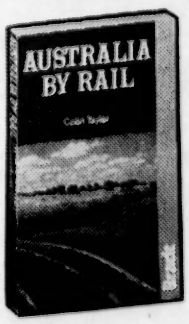
Pogy, a unique custom-designed cruising boat. —Long Strokes

Australia by Rail

Yeah, you could drive. Best is to rent a camper-van. But the distances are geat, the road conditions tough (and off-limits to many rental vehicles) and the road net is not extensive. Yeah, you could fly. But then you don't see much, your wallet gets lighter faster, and there's the annoying airport/accommodations gavotte at either end. Now for the trains: they run on the ground where you can see things — from, often as not, an air-conditioned car. It can be a sleeping *car, cutting hotel expenses noticeably. Clever scheduling, which can be done before you leave your home burg, can give you a taste of the whole of Australia in less than a month. A remarkable bargain, the Austrail Pass helps keep expenses in line. Tempting, that. This book is what you need to know. —J. Baldwin*

•

Whilst in Europe the cost of sleeping berths on trains (other than couchettes) is extremely high, it is not so in Australia. You can spend nights sleeping comfortably on a train for less than it costs in a good hotel and can wake up in a new place every day with new things to see and do. . . . A twin berth sleeper on an interstate train costs $74 compared to $100 or more for a double room in a first class (4 star) hotel in a city such as Melbourne. For the single traveller the difference is greater ($37 as against about $90). Although the train cannot offer quite the luxury of the hotel, it is still, with air-conditioning, private toilet and shower, an attractive proposition for the traveller wishing to use limited time to the best advantage.



Australia by Rail
Colin Taylor, 1988; 141 pp.

$12.95 ($15.45 postpaid) from:
Hunter Publishing, Inc., 300 Raritan Center Parkway/P. O. Box 7816, Edison, NJ 08818-7816; 201/225-1900
(or Whole Earth Access).

•

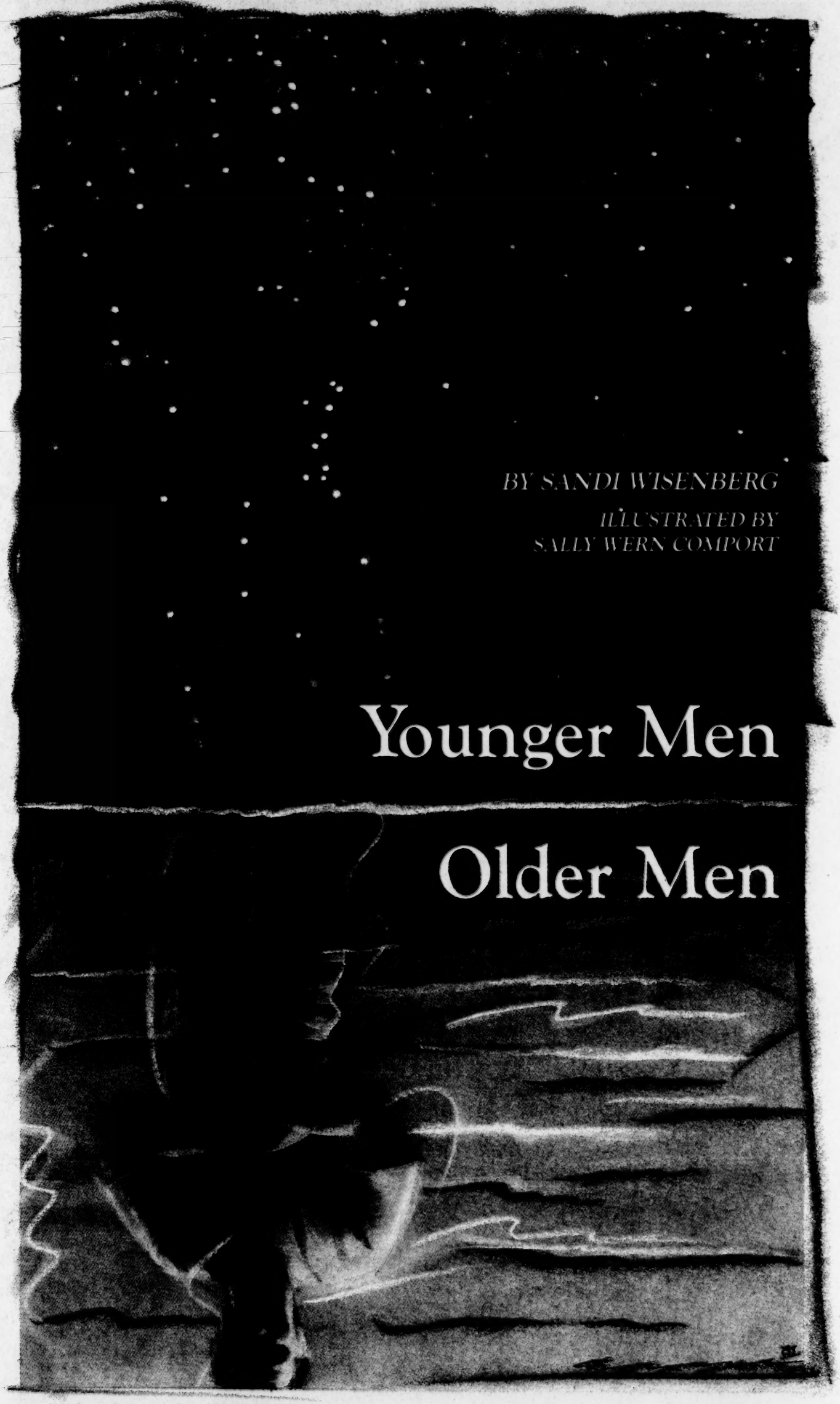
The home-cooked roasts (that is, cooked on board) of Queensland's trains have a high reputation. Main meals cost no more, often far less, than they would in a restaurant. Trains like the Sydney and Melbourne Express and the Queenslander more than border on gourmet style food. Less extravagant is the humble Railway Pie, which has recently made a comeback, and is very tasty, inexpensive sustenance for the hungry, even if a trifle messy to consume.

As for breakfasts, the Railways of Australia do better than most. Not all Australians really consume chunks of steak or chops with egg for their daybreak meal, but on most of the overnight long distance trains you would certainly think they did. Try it.

BY SANDI WISENBERG

ILLUSTRATED BY
SALLY WERN COMPORT

Younger Men Older Men



YOUNGER MEN

AROUND YOUNGER MEN I feel less lost in the world. I lend them books, and recommend others. It is not quite crucial what they are doing right now because their futures beckon on the horizon. They do not have to unlearn chauvinism; they know automatically to refer to me as "woman" instead of "girl" (or maybe it is because they see me as old). They lack the gloss of politeness. They do not annoy me by helping me on with my coat and arguing who pays for tickets (they are usually broke) but they also do not think to unlock my car door first so I will not have to stand in the cold.

They are good if you do not want anything serious. They are too young to be taken seriously, carry with them the magic of impossibility. They are too young to plan the future with. Their lives are filled with unknowns, a string of X-factors.

They are romantics. They will walk in new snow at midnight to make angels. Or to the beach at dark to wade. They will tell you their dreams, attaching an almost preternatural significance to them. They cast some spell of remembrance, awake something in you so that every time it snows new and wet and full, or you look at the water, black and rushing, you think of them.

They may be flailing at life, like the miller's daughter alone with a roomful of flax and no Rumpelstiltskin to weave gold cloth. I am not Rumpelstiltskin. I have no magic formulae. I need the Younger Men, too. But their rough edges snag me, making small scratches they aren't trained to discern. They have the ability to bruise hearts but their own hearts are not bruised and weathered enough to be wise. My heart still feels young, but buffeted. "My heart is soft," I say to a Younger Man. "I'm afraid to let it out alone without a guide. It could get hurt."

The Younger Man says, "Yeah." Younger Men examine my metaphors like quaint handcrafted ornaments, or they do not quite understand them. Sometimes I have to explain my jokes. Their older brothers (younger than I am) laugh.

The Younger Men are misers or spendthrifts with language; youth makes everything extreme. The miser will flinch at the word "love." When I use it, he says, "Yeah." Or, "That's nice."

The spendthrift believes too much in language, gets me lost in its ocean. He crafts swirls of rococo, curves I let overwhelm me. He cannot assay the deadweight heaviness of the words. He is a boy who throws stones in the dark without thinking they could hit a soft body hidden in shadow. He is drunk with the power of dad's new gas guzzler, barely under control. We say silly things to each other about June bugs, quote *The Little Prince* in French and English. Giddy and greedy, we drink the word "love" like chilled champagne. He sends words I fall in love with, that I catch drunkenness from.

Our timelessness ends. I begin to look ahead. The spendthrift Younger Man chides me for breaking our pact to live in the present. He is young enough to believe in each day as a *tabula rasa. Ad infinitum.* No plans. I cannot live without plans. I keep journals, write in my calendar, look in the mirror. My watch has a second hand; I take my pulse after running. Time moves differently for Younger Men.

My heart comes back to me with another bruise.

If this were an earlier century, I would be content to grow into an old-maid schoolteacher, a nice great-aunt clutching mysterious pictures to my heart, sighing when I dust them. But this is a different age and women are not content with so little. A past is not enough. We want futures. We are less willing to settle.

I lose my trust in words. They are dry and thin as leaves. They are useless in the winter. You cannot stuff words in the cracks of a cabin, can not keep a strong fire going with them.

And then my heart, young and foolish, takes to more images. It begins to fill up on thoughts of another Younger Man, thoughts that take over like a tropical disease, impossible to rout. The image cannibalizes some crucial section in my brain, slowing my thinking processes by half. When we speak, finally, on the phone, his voice is small, rough, raspy. In person he is impatient, wearing the face of the Sphinx. He is not what I had ordered. ►

Sandi Wisenberg teaches writing at the School of the Art Institute of Chicago. She is 33. —*Richard Nilsen*

The next day I realize I am no longer addicted. Somehow his image has burned away. I try to conjure him up but cannot. The projection room that played his picture is boarded up. No trespassing.

I realize that I am looking for one Young Man to save me, to sweep me from my life. As Jews, we do not believe in redemption offered by a man who bled for us and came down from the cross for us so that I could mourn and be cleansed. I don't honestly believe in the coming of the messiah. But as women, that is the dogma we are raised on, that one man can sweep down and save us, from ourselves, from other men, from despair, can sweep us into his life, save us by his magic chanting of "I love you, I love you." This is the stuff from which we spin our beliefs. We women are all spinners, that is what we are trained to do from the beginning. At birth we are given the skein and later, our own lambs. We sacrifice them to our dreams.

And I look up at yet another Younger Man, wondering whether I want to surf upon the waves of his energy, or if I want to contain it, the way my mother tried to capture mine and bottle it and bury it because the wind of it frightened her, the sparks of it frightened her, the direction of it frightened her; she was afraid it would take me away, her daughter lifted and departed in a strong wind. The one who might not come back.

But in truth our own wings are removed when we are too young for the pain to do permanent damage (our elders suppose). We shy away from strong winds, yet a certain restlessness pervades when the tide is high, the moon, full. We belong in that dark sky. We see the Younger Man's silhouette against the moon.

OLDER MEN

OLDER MEN ARE AMUSED by me. I become light, fey. I move faster, dance around their doubts and Oldman worries. They become older, and I, younger. The canyon widens. They smile through their wrinkles. They feel each one; they have heard each wrinkle forming. They care about bedtimes, though some of them stay up all night — dinner at 11, driving around to find an all-night restaurant — and then the staying up late is habit, the joy removed because it has become part of a Lifestyle, something they label. They eat the same thing for breakfast each day: coffee, cereal. Sometimes they jog. If they do, they do it religiously, the way they listen to "Morning Edition" on National Public Radio and snap the string around the newspaper or release it from its blue plastic bag. They talk about the SDS only remotely, but remind me, "I Was There." Close enough to see the action, while at the time I was passing notes to girlfriends about some boy in the third row in Physical Science. They no longer consider going back to school, but changing jobs. When they move, professionals do it, hired by the new company. They are semi-valued employees. What depresses them are their children, the evaporation of promise in their ex-wives, the bounds of their imaginations. They have not returned to Europe in years. They are very serious about mortality, which has become as familiar as a dinner guest. Their opinions are deep and maybe fervent but not redhot like young activists who know everything — who the Older Men, by the way, resent and do not understand. The Older Men say soft, diversionary things like, "That is a different answer to the question." They too can lapse into rhetoric, but the better ones catch themselves at it, smiling. They are no longer angry with their parents.

It can go either way with Older Men. They can hurt deeply and be hurt. Their hearts are scarred in battle, soft as berries in places they do not often expose. They are polite. They try to pay. There are Fun ones and Politically Correct ones and those who encourage you, are beyond competing. They do not gulp at life. They have acquired a certain grace to their movements.

They are at their best when they are laughing — as long as it is an easy laugh, not one that is frightened, conscious of itself as part of a finite supply, anxious about the next one; joy rarely arrives on schedule.

Older Men are not looking for saviors. They try, every day, to become existentialists. But when I look up at their faces and squint, I think I see in their eye that same hungry look reflected from mine. ■

The Eden Express

In 1971 Mark Vonnegut went crazy while living the Good Hippie Life on a commune in British Columbia. In many ways his bouts with schizophrenia fulfilled his aspiration to live an Eden-like existence where the Inner and Outer are one. Schizophrenia brought him to Eden in record time — hence the title. It also brought him terrifying delusions, incapacity, anorexia, and close to the brink of suicide many times. His experience was quite different from the journey to wholeness envisioned by counter-cultural psychiatrists, which led him to write an article, "Why I Want to Bite R. D. Laing's Leg," and eventually this book. His recovery, which at the time he attributed to orthomolecular (megavitamin) therapy, inspired him to return to school, and he has since become an M.D.

It's been out of print for years, but recently ***The Eden Express*** *has been re-issued. Don't miss it this time around. It's well worth reading as (1) a vivid first-person account of schizophrenia (though these days Vonnegut diagnoses himself as having been "manic-depressive"); (2) a cultural document of the sixties — one of the best in my opinion; and (3) an engaging, thoughtful, funny, and honest story that will keep you up late turning pages. I've read it several times and it stands up as well as, or better than, anything his father, Kurt Vonnegut, has written.* ***The Eden Express*** *also contains some good information about schizophrenia and its treatment with a new update from Dr. Vonnegut.* —Jack Trainor

•

I don't pretend to know any more than anyone else about what happens after death, but if there is such a thing as hell and it's anything like some of the things I went through when I was nuts, and you can avoid it by doing things as pretty as not coveting your neighbor's ass, by all means, DO NOT COVET YOUR NEIGHBOR'S ASS.

•

And then, seemingly out of nowhere, all hell broke loose again and I was back in that fucking little room. No visitors, no clothes, no one would even talk to me through the little hole, no nothing.

McNice came in one day with three of the meanest orderlies. I had been utterly alone for days.

"I think I'm dead, I'm dead, aren't I?" pleading and grasping for his arm.

"Yes, I know you feel like that." He left quickly. The orderlies held me down and jabbed another needle in my ass.

The third crackup was different from the first two. In lots of ways it was the worst.

Not much fun or funny happened the third time I cracked. Maybe it was because I cracked in the hospital and there was no running room, no slack, no chance for the Eden Express to get up a decent head of steam.

The Eden Express
Mark Vonnegut, 1975; 276 pp.
$4.95 ($6.95 postpaid) from:
Dell Readers Service, P. O. Box 5057,
Des Plaines, IL 60017-5057;
212/765-6500
(or Whole Earth Access).

Maybe it was because I really didn't want to go crazy then. I really tried to stop it and couldn't. Both other times there had seemed to be some point in it.

•

They used electroshock on me. There was nothing I or my parents or any of my friends could do to stop them. I was scared to death of it. It probably did me some good. . . .

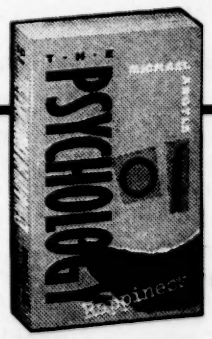
I thought the purpose of it was to make me forget things that were bothering me. I composed a series of ten rhyming couplets that included all the most awful things that had ever happened to me and scratched the first letter of each line in the wall behind my mattress. For the experience itself, I was knocked out with sodium pentothal. Just before I went under I remember saying to the doctor in charge that I didn't think this was such a good idea. When I came to, about fifteen minutes later, I was disoriented for a bit but remembered my ten rhyming couplets without having to look at the wall. Except for a bitch of a headache, I felt fine.

The Psychology of Happiness

All the things that age and wisdom teach about the attainment of happiness — that it has very little to do with money, status, or privilege and very much to do with hope and friends — are backed up by dry academic studies (with scientific citations galore) in this book, should you need this kind of convincing. —Kevin Kelly

•

A widely shared, commonsense theory about the cause of happiness runs something like this: in order to be happier one should earn more money, which is in itself a disagreeable task, spend it on houses, or better houses, cars, furniture, holidays, food and drink, and these things will make one happy. As we have seen, the evidence does not give much support to this theory. Richer people are a little happier than poorer people in the same country, but not much happier. If economic conditions improve for everyone there is sometimes a reduction in general satisfaction. And there is little relationship between happiness and prosperity when different countries are compared.



The Psychology of Happiness
Michael Argyle, 1987; 256 pp.
$14.95 ($16.70 postpaid) from:
Methuen & Co., 29 West 35th Street,
New York, NY 10001; 212/244-6412
(or Whole Earth Access).

Satisfaction with income depends more on comparisons with the incomes of others than on actual income — what people really want is to have more than other people. An individual is also 'more satisfied' if things are better for him or her than they were in the past.

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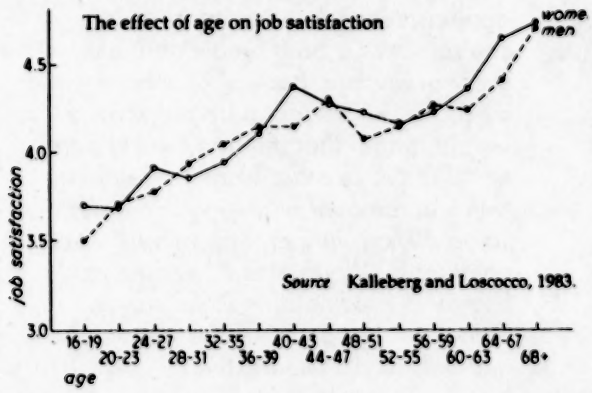
Satisfaction
Is affected most by work which is intrinsically satisfying. This is not necessarily the most highly paid work, though this



tends to be more satisfying than less well paid work. It is work that gives intrinsic satisfaction, because it is interesting, seems valuable and worthwhile, requires the use of skills, is sufficiently demanding, allows some freedom and autonomy, and is not too repetitive. Many individuals do not appreciate the hidden benefits of work until they lose their jobs — filling and structuring time, giving status and identity, social contacts outside the family, and linking to broader goals and purposes. Unemployed people are happiest when they can find alternative activities which provide similar benefits.

ANTIDOTES TO DIETING

BY SARAH VANDERSHAF

READING MOST DIET BOOKS is a waste of good eyesight. For creativity, some of them rank right up there with the great works of fiction, but none tells its readers what they want to know — how to lose a substantial amount of weight, permanently. That's because all diet books are, to a greater or lesser extent, based on a number of commonly accepted fictions about food, weight, and dieting: that fat people are fat because they eat more than others, or because they don't eat in a "proper" way. That eating less guarantees weight loss. That it is even necessary for all fat people to lose weight, for the sake of their health or their self-esteem. None of these assumptions are necessarily true, although the profits of the huge U.S. diet industry depend on widespread belief in them.

The following books and magazines are antidotes to diet books. They are some of the best from a school of thought that has emerged in recent years: diets don't work, and for most people, they aren't necessary, anyway. But in a culture that glorifies the sylph, it is easier to write about being satisfied with one's own natural weight than it is to live it.

The Dieter's Dilemma

William Bennett and Joel Gurin
1983; 329 pp.

$10.95 ($11.95 postpaid) from Harper & Row, Rt. 3/Box 20B, Hagerstown, MD 21740; 800/242-7737 (or Whole Earth Access).

When this book appeared in 1983, it represented a real breakthrough in popular understanding that overweight and overeating are not always connected. The authors, a health journalist and a doctor, present a "scientific case against dieting as a means of weight control" that is both simple and intuitively believable. Each of us is born with a natural weight (or, more properly, a weight range) that the body works hard to maintain. In other words, a setpoint, which no amount of dieting can lower. Yo-yo dieting, in fact, may drive the setpoint up by "frightening" the starving body into holding onto its fat stores. Only exercise can lower the setpoint, and only to a limited extent.

When I first read ***The Dieter's Dilemma****, I was astonished. Not at the setpoint theory, which just confirmed what I and practically everyone else already knew — that some people can eat like horses and stay skinny, and others can eat like birds and stay fat — but that a book on weight control had been published* advocating an approach that no one could make a penny from! *There is no commercial tie-in with safflower oil capsules or protein powder. This book's only sales pitch is to be satisfied with your weight. (Of course, I underestimated the diet industry's resourcefulness. It didn't take long for a major corporation to invent a new contradiction in terms, "The Setpoint Diet.")*

Iconoclastic from beginning to end, ***The Dieter's Dilemma*** *reviews the history of dieting with a critical eye. Along the way, it zaps protein-sparing fasts, Richard Simmons, Weight Watchers, Schick Centers, psychological explanations for obesity, and those "ideal weight" tables as all being part of the problem, not the solution.*

Before you go on any diet, read this book.

•

The common conception of weight control is based on three assumptions. First, the body doesn't really "care" how much fat it has; it merely stores the energy leftovers from each meal. Second, eating is the significant behavior; fat people obviously eat more than people of normal weight. Third, the conscious mind is capable of balancing intake and expenditure of energy and thus achieving any desired weight. It is quite easy to show that these assumptions are false.

Heresies 21: Food is a Feminist Issue

Edited by the Heresies Collective
1987; 94 pp.

$6 postpaid from Heresies, P. O. Box 1306, Canal Street Station, New York, NY 10013.

*Twice a year, the Heresies Collective publishes a collection of feminist political writings and art on a single topic (****WER*** *#62, p. 117). Food, and women's relation to it, is the subject of* ***Heresies 21****. In treating food as politics,* ***Heresies*** *embraces worldwide problems, such as the inadequate nutrition of Third World women, who get less, and lower-quality, food than do their men. But the collection's main focus is on the food-weight-self-esteem equation that permeates the lives of American women.*

The essays, poems, and paintings in ***Heresies*** *vary widely in quality, and may strike the reader as silly, pretentious, funny, important, irritating, infuriating, wrongheaded, or marvelous. That's the point — to elicit a reaction, to make the reader think about food as more than just nutritive fodder. After reading* ***Heresies****, you may never look at a tomato in the same way again.*

•

While Floss was dieting, she never had to confront the fat woman who lived in her body, the woman with the great passions, the woman of large ideas. As long as she dieted, she could pretend to be a thin woman, an acceptable woman who measured her life out in small portions. Her fifty-eight previous diets were a powerful tribute to the tenacity of this illusion.

Suzanne Siegel, *Our Lady of Constant Calorie Counting*, mixed media with photo self-portrait, 1982.

Fat is a Feminist Issue

(Vols. I & II)
Susie Orbach, 1982; 171 pp.

$9.15 postpaid (for both) from Berkley Books/Order Dept., P. O. Box 506, E. Rutherford, NJ 07073; 800/223-0510 (or Whole Earth Access).

Although overeating is not always the cause of obesity, it can be in some cases. But what makes people overeat? According to psychotherapist Susie Orbach, compulsive eating is an effort by women to resolve the competing claims placed on them as workers and as nurturers. In this view, fat serves one or more of many purposes: as protection from the world; as a means of avoiding sex or relation-

ships; as an expression of hostility or rebellion; or as a way to opt out of competition, whether it be for career success or for a man.

Though ten years old, ***Fat is a Feminist Issue*** *still presents a compelling analysis of the reasons why some people overeat. Some is the operative word. Orbach never acknowledges the existence of women who are fat, but not compulsive eaters, and she emphasizes achieving "idealized" weight as if weight were only a question of will. And, of course, there is no explanation at all for the existence of fat men, compulsive eaters or not. Still, I'd recommend this book to women caught in an eating obsession, for the sane refuge it can provide.*

Fat is a Feminist Issue II *is part sequel, part workbook on how to put the ideas of the first book into practice. These are not "diet books" — indeed, they come out heavily anti-diet — but people who are fat mainly as a result of compulsive eating will probably lose weight once their problem is mitigated or cured.*

•

Since women are taught to see themselves from the outside as candidates for men, they become prey to the huge fashion and diet industries that first set up the ideal images and then exhort women to meet them. The message is loud and clear — the woman's body is not her own. The woman's body is not satisfactory as it is. It must be thin, free of "unwanted hair," deodorized, perfumed and clothed. It must conform to an ideal physical type. Family and school socialization teaches girls to groom themselves properly. Furthermore, the job is never-ending, for the image changes from year to year.

Feeding the Hungry Heart

Geneen Roth, 1982; 212 pp.

$4.50 ($5.50 postpaid) from New American Library, P. O. Box 999, Bergenfield, NJ 07621; 201/387-0600 (or Whole Earth Access).

Geneen Roth is not an "expert" on compulsive eating — not a nutritionist, not a psychiatrist. She merely has been a compulsive eater for almost all her life. With a lifetime to think about her disorder, Roth has developed great insight into the phenomenon of compulsive eating, which she has put into this book.

Her advice to readers is essentially the same as the advice in ***The Dieter's Dilemma****: eat normally, as your body dictates, and it will settle into its natural weight. Which may not qualify you for the cover of* ***Vogue****, but is healthiest and sanest in the long run.*

Roth doesn't mention the setpoint theory as support for her view; ***Feeding the Hungry Heart*** *came out the same year as* ***The Dieter's Dilemma*** *did, so Roth probably hadn't heard much about setpoint theory. Instead, hers is a commonsense approach. After trying literally* everything *to lose weight, including a bout of anorexia, Roth realized she was wrecking her physical and mental health. Her experience is underscored by the autobiographical short stories written by the women in Roth's workshops for compulsive eaters. These small essays of pain and courage can give moral support to compulsive eaters. For anyone, they provide a glimpse into the eternal human struggle to feed hungers, of the stomach or the heart.*

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If you use food or any other tangible substance — alcohol, cigarettes, drugs — as your main source of psychic "nourishment," you never get full. Food, being a tangible substance, cannot satisfy intangible needs. It can numb you, drug you, but it cannot nourish you.

Radiance

Alice Ansfield, Editor

$12/year (4 issues) from Radiance, P. O. Box 31703, Oakland, CA 94604-9937; 415/482-0680.

This magazine is one of a handful aimed at "large" women who are happy with the way they are. ***Radiance*** *concerns itself with health, fitness, and fashion — areas not generally seen as appropriate to fat women, unless they're on a diet.*

Not a feminist publication per se, ***Radiance*** *attracts readers of diverse opinions. The lively letters column may include criticism of a fashion spread of fur coats and a complaint from a "conservative Christian" that the magazine doesn't print enough recipes. But most letters have one thing in common: they are expressions of gratitude to a publication that finally balances the countless magazines devoted to perfection through calisthenics and cottage cheese, and shows fat women in a positive light. Now all we need is a magazine that gives similar support to fat* men.

•

Even though fat people have a perfectly normal aerobic capacity, and have the ability to improve it with regular exercise, most people still use the terms "overweight" and "out of shape" interchangeably. A 1978 book titled *Fit or Fat?* equated amount of body fat with degree of fitness and offered a program to minimize body fat (thus maximizing fitness, the author assumes). Unfortunately, exercise physiologists have perpetuated these unfounded myths by claiming that fat people are unfit by virtue of having a low aerobic capacity. They make this claim because they divide aerobic capacity by body weight, reporting it as aerobic capacity *per body weight*. Naturally, anyone with a high body weight will appear to be unfit by this yardstick. One could just as easily argue that aerobic capacity should be corrected for by height, thereby "proving" that all tall people are unfit!

National Association to Advance Fat Acceptance

Membership **$35**/year (includes monthly newsletter) from NAAFA Membership Services, P. O. Box 43, Bellerose, NY 11426; 516/352-3120.

Yes, fat. *NAAFA members insist that they be called, not plump nor chubby nor zaftig, but fat, for the same reason that blacks 20 years ago wanted to be called black and not "Negro." When you are proud of what you are, a euphemism is an insult. But most fat Americans are not yet ready to march down the streets of America chanting "Fat is beautiful." Wherein lies NAAFA's challenge: to battle what is perhaps America's last truly universal prejudice.*

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A copy of the following activism letter was received from a NAAFA member (name withheld):

Mr. Robert Stempel, President
General Motors Corp.
3044 West Grand Blvd.
Detroit, Mich. 48202

This week we purchased a 1988 Fleetwood Brougham D'Elegance from our local Cadillac dealership — advertised by your company as the largest production car made. Imagine my amazement when I discovered that the Fleetwood Brougham's seat belt did not fit me. Although fat people are not shown in your advertisements, here I am, proof that we do indeed purchase your cars. When I ride in friends' cars such as Ford Escorts, Thunderbirds, Buick Sommersets, etc. they all allow me to ride safely because their standard equipment belts accommodate me. . . . As a consumer I'm upset; as a stockholder I'm concerned.

Shouldn't the largest production car made accommodate some of the larger "production" people made? ■

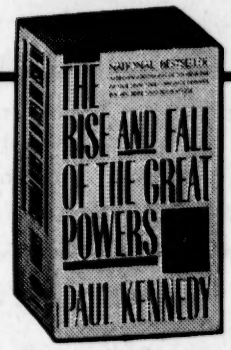
The Rise and Fall of the Great Powers

Any title containing "Rise and Fall" brings to mind Gibbon, who analyzed the Roman Empire in five volumes. Paul Kennedy, a history professor at Yale, is more ambitious. He gives us 500 years of Great Powers in 600 pages, from the Ming Dynasty and Ottoman Empire to today's superpowers. His analysis is based less on personalities and battles than on numbers, and his theme is unusual — the relationship between economic change and military conflict. For Kennedy, numbers translate into Rise and Fall. Steel production translates into cannons, population figures into soldiers and national indebtedness into the day the king's credit is cut off, along with his ability to maintain a war. Armies march on their stomachs, but nations fight with their treasuries, natural resources and morale.

The book isn't just numbers tho, it's also a compact review of global history. Much here is new for those of us who had history presented as a series of events revolving around the U.S. Examples range from the collapse of the Spanish Empire when debt payments reached two-thirds of national revenue, to the revitalization of a demolished post-war Japanese economy by U.S. defense spending during the Korean War. Each example adds weight to the author's theme that no country can stay on top forever.

Kennedy closes with speculation on the future. His economic sense is keen, tho some of his political insights are disappointingly orthodox. In any event, this fact-filled but slightly dry history book became a bestseller, no doubt due to the dramatic edge it adds to current headlines of a government wallowing deeper into debt. For a meaningful background to the economic minutiae of daily news, I've read no better volume.

—Dick Fugett



The Rise and Fall of the Great Powers
Paul Kennedy, 1987; 677 pp.
$12.95 ($14.45 postpaid) from: Random House/Attn.: Order Dept. 400 Hahn Road, Westminster, MD 21157; 800/726-0600 (or Whole Earth Access).

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[America], like Imperial Spain around 1600 or the British Empire around 1900, is the inheritor of a vast array of strategical commitments which had been made decades earlier, when the nation's political, economic, and military capacity to influence world affairs seemed so much more assured. In consequence, the United States now runs the risk, so familiar to historians of the rise and fall of previous Great Powers, of what might roughly be called "imperial overstretch": that is to say, decision-makers in Washington must face the awkward and enduring fact that the sum total of the United States' global interests and obligations is nowadays far larger than the country's power to defend them all simultaneously.

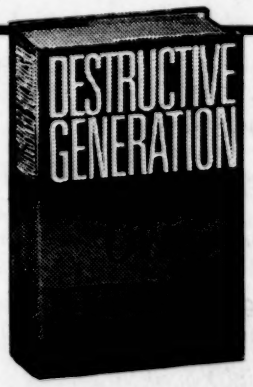
Destructive Generation

The onslaught of the sixties revival has brought both nostalgic memoirs of the barricades and bitter re-evaluations. This book falls in the latter camp with a vengeance. Authors Collier and Horowitz were once editors of ***Ramparts****, which is to say serious left intellectuals with an eye for the sensational. They shared in the confused demoralization of the U.S. left in the wake of the Vietnam War's end, a process that left many a former activist adrift in the space between ideals and reality. Yet when they set out to journalistically explicate the real facts hidden by the revolutionary image of groups like the Black Panthers or the Weathermen, they were hounded out of the left. In a classic case of reaction formation, Collier and Horowitz became fervent anti-communists and supporters of Reagan and the Contras.*

Despite all that, or perhaps because of it, ***Destructive Generation*** *is a valuable rethinking of the New Left's history and legacy. I challenge anyone to remain unmoved by the opening chapter's requiem for radical lawyer Fay Stender, who ended up a suicide after being paralyzed in a murder attempt by the very convicts she had devoted years to defending. The full story of the fallout from supposed radical prisoners like the Black Guerrilla Family and Tribal Thumb remains to be told, but Collier and Horowitz at least have begun the process. Similarly, their jaundiced reflections on Berkeley, America's most radical city, hardly tell all, but they tell far more than anyone else has dared.*

At times repetitive, occasionally self-serving, ***Destructive Generation*** *is not a perfect critique of what the New Left has become today. The authors fail to grapple with the Women's Movement and its effect on the left — feminism is generally conspicuous by its absence in the book — and their few dismissive remarks about "hippies" suggest that they missed out on the insights shared by hundreds of thousands on LSD. Still, Collier and Horowitz hit more than a few targets right on the button, making this an essential read. The medicine may have a bitter taste, but it'll help drain your sinuses.*

—Jay Kinney



Destructive Generation
Peter Collier and David Horowitz
1989; 352 pp.
$19.95 ($21.45 postpaid) from: Simon & Schuster/Order Dept., 200 Old Tappan Road, Old Tappan, NJ 07675; 201/767-5937 (or Whole Earth Access).

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The arrest of a black ex-prisoner, who turned out indeed to be a follower of George Jackson, for the shooting of Fay Stender sent shock waves through the radical legal community. People who had spent their professional lives denouncing the criminal justice system as an instrument of racial and class oppression and defending accused criminals as social victims found themselves identifying with the efforts of the police and the district attorney's office. Fay's former law partner Doron Weinberg remembers sitting with a group of radical attorneys when the news came of the arrest. "From the first reports it seemed like a bad search. Everyone in the room had to grapple with the same questions: Oh, my God, is this guy going to get out on a technicality? Is some civil liberties lawyer going to come along and get him off? Did the cops fuck up again?"

A Pandora's box of doubt and self-recrimination had been opened and would not close. "I was with two radical attorneys after Fay was shot," recalls Barbara Price. "They were talking to each other and saying out loud what I figured they had never said out loud before about their own criminal practice. They each spoke of how they had successfully defended people on assault and murder charges. They had defended them as radicals who felt it was the system that had put them in the position of being criminals. Within a few months of acquittal, their clients had each murdered some person. And now they had to live with that."

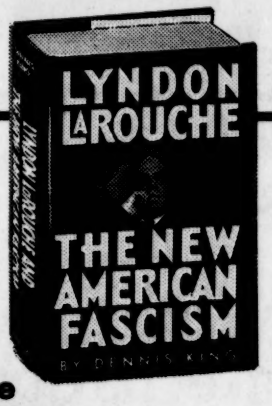
Lyndon LaRouche and the New American Fascism

As an inveterate connoisseur of conspiracy theories I have to confess that I've had something of a soft spot for Lyndon LaRouche over the years. The man's political cosmology was just so damn baroque that one could spend months or even years trying to piece it all together, by which time it would, of course, have entirely changed. Meanwhile, his more infamous allegations such as pegging the Queen of England as a global druglord or Henry Kissinger as the root of all evil led most observers to dismiss the man as crazy. Not so, not so, contends Dennis King in this exhaustive exposé of LaRouche and his followers. According to King, LaRouche cultivated the kook image as a means of deflecting more serious scrutiny, all the while developing a cult of personal intelligence operatives maniacally dedicated to helping him achieve political power.

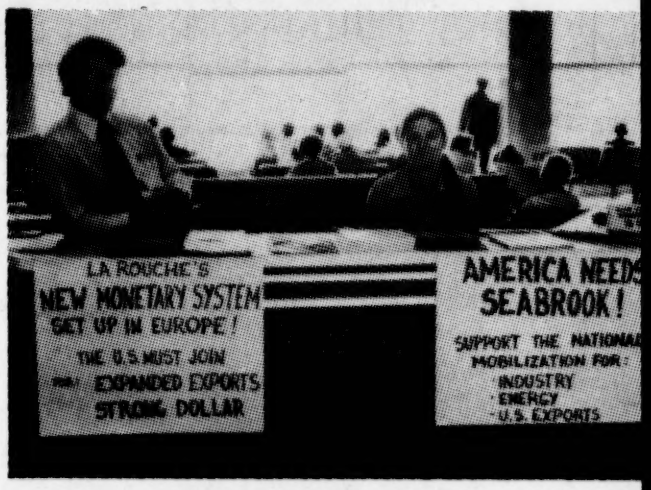
King chronicles LaRouche's rightward journey from his origins in U.S. Trotskyism onward to poaching followers from SDS, then to founding the National Caucus of Labor Committees and the U.S. Labor Party, his assorted cavorting with KKKers and Teamsters, and his final posture as a "conservative Democrat" campaigning against drugs and AIDS victims. King offers copious evidence in support of his theory that LaRouche and Co. represent the closest we've come to a true domestic fascism in recent decades. By his detailed exegesis of key LaRouche policy papers, King makes a better case for this drastic evaluation than I had expected.

LaRouche and his top leadership are now in prison in the wake of charges related to obstruction of justice, tax evasion, and credit card fraud. Yet it is unlikely that they are gone for good from U.S. politics. This book is the definitive guide to what we might have in store should their quest for power get back on course. —Jay Kinney

The LaRouche organization has sponsored literature tables at dozens of airports across the country since the mid-1970s. While promoting nuclear energy, Star Wars, and other high-technology causes, the NCLC members at these tables raise tens of thousands of dollars a week. Prosecutors charge that customers who pay by credit card are sometimes victimized by unauthorized additional charges to their accounts. They may also be contacted by telephone fund raisers.



Lyndon LaRouche and the New American Fascism
Dennis King, 1989; 415 pp.
$19.95 ($21.95 postpaid) from: Doubleday & Company, Inc./Cash Sales, P. O. Box 5071, Des Plaines, IL 60017-5071; 800/223-6834 ext. 479 (or Whole Earth Access).



The Child Abuse Industry

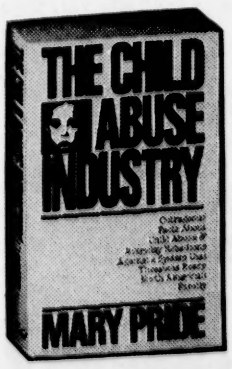
We have a friend defending several people convicted of the most outrageous child-abuse crimes; after more than two years on the case, he is convinced, as are we, of his clients' innocence. Child witnesses lied, social workers manipulated testimony, police allowed their imaginations to direct their investigation, and medical doctors buttressed failing careers with fallacious testimony. It's all coming unraveled now, as they approach a new trial when the children will recant and more sophisticated medical experts will destroy the earlier findings. Our friend's clients, who are now serving prison terms beginning at 200 years, will ultimately be released. •

Hence our interest in this subject, which has led us to discover that our friend's clients are not alone: all over the country this crazed hysteria about child abuse has led to the mistaken convictions of hundreds of innocent people. (Not that child abuse doesn't exist. It does, and is a serious problem, but this hysterical overreaction is a distinct and devastating other phenomenon.)

Mary Pride has written a book on the subject which is factually accurate and a cornucopia of resources for parents and child care workers who feel threatened by the possibility that they may be accused of child abuse. Short on case histories, and assuming a sympathetic audience, the book details the machinations of the social-welfare child-protective system ("WE JUST WANT TO HELP") with uncompromising and scathing language. The abuse of power in the helping professions is articulately and carefully detailed by an author who pretends to nothing but naked contempt for their effect upon the American family.

And it is this conservative loyalty to family which is the irony of this "movement" against the child-abuse hysteria, for this book, like many of the others (which are less authoritative) places itself wholly within the circle of pro-lifers, anti-feminists and fundamentalist Christians in its defense of those accused of heinous crimes. It's an odd and humorous grouping, perhaps telling about the breakup of traditional alliances, but that's a different subject. It's a worthy, truthful book on the subject, the best resource we've discovered so far.
—Catherine Campbell and Michael Phillips

The Child Abuse Industry
Mary Pride, 1986; 268 pp.
$8.95 ($10.45 postpaid) from: Crossway Books, 9825 W. Roosevelt Road, Westchester, IL 60153; 800/323-3890 (or Whole Earth Access).



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Once accused of child abuse, you have no due process rights. Why? Because *you have not been charged with a crime! Child abuse is not a crime.* Your children were not arrested, but taken into "protective custody" (or threatened with same). You were not arrested. You find yourself in Juvenile Court, where proceedings are confidential "in order to protect the child." The judge does not have to hear your evidence unless he feels like it. If you actually know enough to appeal his ruling, this may not help you, because *only evidence that was allowed in the previous hearing is heard in the appeal.* You have no right to a trial by jury, no right to cross-examination of witnesses, no right to face your accuser, etc., etc. Furthermore, your child may be represented by a "guardian ad litem" who is supposedly protecting the child's best interests, *in opposition* to your interests. (Your child, in other words, cannot be represented by your attorney.)

Good Videos:
International Psychological Dramas

BY SARAH VANDERSHAF

DESPAIR

THE CONFORMIST

To American filmmakers, "horror" generally means the monster of the week, backed up by splashy special effects. But foreign psychological dramas deal not with obvious, literal terrors, but with the horrors of the mind. The following films, all available on video from Facets Multimedia Inc., 1517 W. Fullerton Avenue, Chicago, IL 60614 (800/331-6197), are both unsettling and fascinating to watch.

—Sarah Vandershaf

Despair (1979, Germany)

Rainer Werner Fassbinder directed this adaptation of Vladimir Nabokov's story of murder and madness in Berlin in the early 1930s. Dirk Bogarde stars as Hermann, an exiled Russian aristocrat whose life is crumbling on all fronts. Hermann's chocolate factories are going bankrupt because of Germany's ruined economy, and his wife is carrying on with her cousin, a mooching and talentless "bohemian artist."

Hermann manages to cope, even keeping up a running sarcastic commentary (which includes some of Nabokov's wittiest lines) on the political and economic chaos around him. Hermann's assistant shows up for work one day attired in Nazi brownshirt. Hermann: "You join the Boy Scouts or something?" Assistant (chagrined): "Do you mind me wearing a uniform in the office, sir?" Hermann: "No, it's most appropriate. A chocolate-colored jacket."

But as Hermann's life becomes more intolerable, he begins to hallucinate that events are not really happening to him. Rather, he is merely a spectator watching the movie of his own life. He dreams up a way to escape — hiring a "double" to take his place in the movie — a plan, based on a delusion, that ends in death.

Diabolique (1957, France)

A spooky boys' school is the setting for this classic thriller. The school's headmaster is such an intolerable jerk that both his wife and his mistress wish he were dead. The mistress, played to sultry perfection by Simone Signoret, comes up with the "perfect murder," and the women decide to make their wish come true.

The wife, threatening divorce, runs off to the mistress's townhouse. The husband, loath to part with his wife's inheritance, follows without telling anyone where he's going. Wife and mistress then drug hubbie and drown him in the bathtub. Surreptitiously returning to the school by night, the women dump the body in the swimming pool. Then they wait for the body to surface, and for the husband to be declared the victim of a tragic accident.

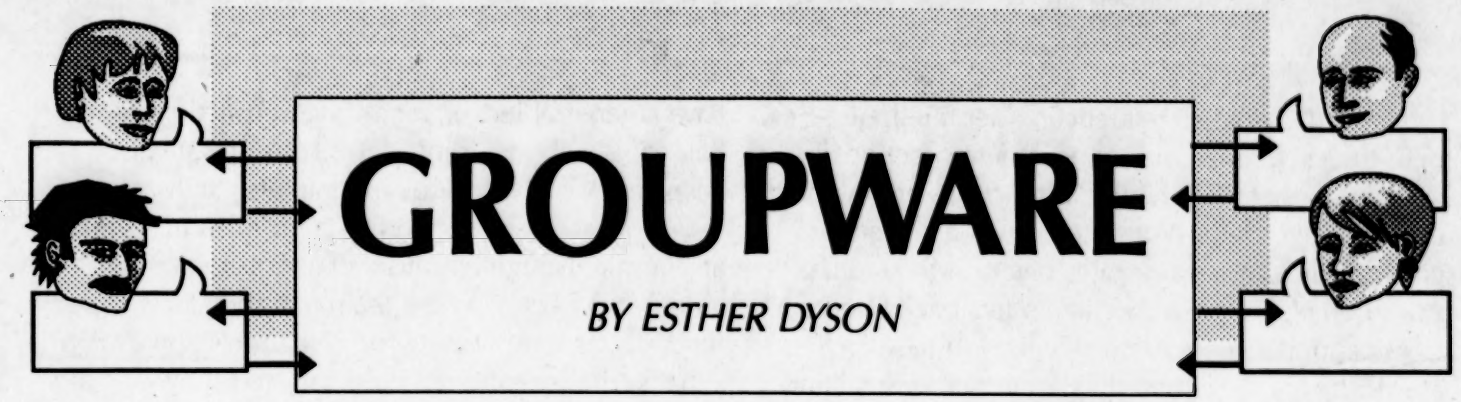
But the husband proves to be as obnoxious in death as he was in life. The body stubbornly refuses to appear on schedule, and when the conspirators have the pool drained . . . things go from bad to worse. Strange events convince the women that hubbie is still somewhere in the school.

The diabolical plot of this film has been copied often enough that you might figure out the ending just from having seen the imitations. But you shouldn't miss the original.

The Conformist (1970, Italy)

In this film, director Bernardo Bertolucci explains the inexplicable — why anyone who is neither insane nor morally impaired would espouse the principles of fascism. Jean-Louis Trintignant portrays just such a man living in pre-WWII Italy. Not crazy nor corrupt, Marcello has an obsessive need for the safety and stability of total conformity. He will go to any lengths to be "the same as everyone else," whether by marrying a shallow, mediocre daughter of the middle class or by becoming an assassin for the political party that happens to be in power.

Marcello and his new bride travel to Paris, ostensibly to visit Marcello's old professor, an Italian anti-fascist living in exile. But Marcello's true motive is to destroy the last vestige of his former individuality: the professor. His mission is complicated by the professor's young wife, Anna, an independent and freeminded woman who has Marcello figured out from the start. Anna makes Marcello question his beliefs and the vacation becomes increasingly tense as Marcello struggles over the relative merits of retaining his conformity or keeping his soul. ■



Kathleen O'Neill

GROUPWARE

BY ESTHER DYSON

Groupware: a framework

The "purpose" of computers is to automate work; for that, the work must be defined explicitly and routine processes and data structures must be identified. In the beginning, we discovered the routine tasks underlying accounting, transaction-processing, and the like. With the advent of pcs, we progressed to financial model-building (Lotus 1-2-3) and text-processing (database management had already been addressed on mainframes). With the current world of networked pcs and departmental servers [pcs that serve as brain hubs to dumber pcs], we are beginning to understand the processes of people working together well enough to automate them, using tools and structures loosely classed as "groupware."

Automation requires discovery of the routines or structures underlying work, and groupware requires discovery of the patterns underlying group work. Structure is regularity superseding anarchy, making apparent disarray orderly and subject to computer manipulation.

In groupware (as in any system), there are two basic focuses of routine: transactions and information. Thus, groupware comes in two forms: transaction-oriented, and information-oriented.

Information-oriented systems generally don't care much about people or timing (big issues in transaction-oriented groupware), although they may well maintain categories of people to manage access rights, and manage multiple versions of the data/objects they store. Their concern is with the information, not with how it got there or who owns it. The wheel is owned by the truck, not by Alice, its designer; a picture may belong to several documents and it is also linked by cross-reference to a mention in the text of one of those documents.

So far, most of the groupware we see for sale is information-based. It provides passive support, rather than active management, of group interaction. Fundamentally, this kind of groupware is about communication — enabling people to share information, build information bases (including documents, designs, and the like) and explore ideas. Rich displays, data manipulation, object-oriented data structures [which move symbols representing complex functions] and editing tools — all these make it easier for people to create and share a vision. This is a valuable function, and one that will continue to grow over the next decade. But it's fundamentally a more mature area, and better understood, than transaction-based groupware, which is the major focus of our discussion.

Transaction-based groupware

Transaction-based groupware is primarily concerned with people and their roles, rather than their actual work product. Rather than the product, it manages the *process* — control of changes, transfer of selected data to those who need it, approvals and requests, submissions and deadlines. The system monitors who has what, who owes what, who may change it, who gets it next, etc. The system doesn't care about the underlying information; it could be text, code, images, diagrams, real-world objects, whatever. Like systems software, transaction-oriented groupware doesn't accomplish anything itself; it supports the coordination of the people who are doing the work.

Transaction-oriented groupware operates independently of the applications that do the work, whereas information-oriented groupware generally operates directly on the users' data, supporting such joint information-manipulation tasks as CAD/CAM [Computer-Assisted Design And Manufacturing], bulletin-board operation or editing of complex documents.

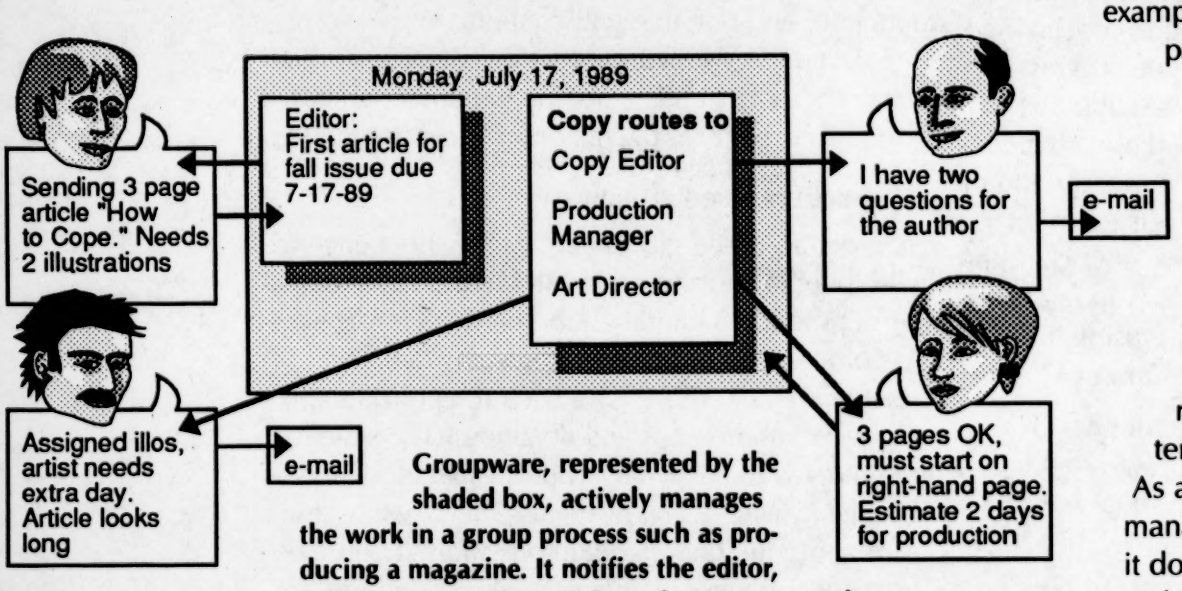
Transactions: the atomic particles of groupware

If data elements are units of information, then transactions are units of activity or process, or work. Just as you can build richer, more complex data elements, so can you build rich, complex, extended transactions that comprise a number of linked transactions, integrity rules, conditional branches, and other attributes and constraints.

Like data elements, transactions are discrete and internally consistent. They can be handled as units:

You may have to persevere to get through the dense technical fiber of Esther Dyson's analysis of near-term software evolution. You'll be rewarded with an astute forecast pointing to a change in the way we work. It's lifted, with permission (and with minor rearrangement to facilitate clarity out of context), from Dyson's remarkably clear-sighted newsletter, Release 1.0 *($395/year from EDventure Holdings, 375 Park Avenue/Suite 2503, New York, NY 10152). Esther Dyson is the computer industry's amazing gypsy-with-crystal-ball. She doesn't look; she* sees. —*Kevin Kelly*

sequenced, assigned, referenced, identified, queried, triggered, etc. One purpose of transactions is to maintain system integrity. Transactions are required to change the status of a system: Juan assigns a program to Alice, Alice delegates part of it to Hannah, Alice completes her work, Juan refers back one item to Alice for decision, Alice promises to have an answer by Friday. Generally, we are not here talking about simple transactions such as order entry or reservation-making; those are transactions between a person and a computer, with the person often acting as the intermediary for a customer. *Groupware transactions happen among people, with the computer as intermediary.*



Groupware, represented by the shaded box, actively manages the work in a group process such as producing a magazine. It notifies the editor, and then routes the article to the proper people.

Extended transactions

A transaction in groupware isn't a simple debit-credit sort of thing; it's an extended process that may involve several people and evolve through a succession of unstable, inconsistent states. In other words, most work is accomplished *during* the transaction, even though system designers traditionally figure that the only good transaction is a completed transaction. A defined sequence (with branches) of transactions can thus represent a "meta-transaction," with requirements for consistency and completeness. (What happened to Hannah's part of the project?) The terminology isn't yet fixed, but the point is simply that defined sequences of transactions, with concurrent events and branches, are fundamental building blocks of groupware. The groupware designer must make sure that the process completes, that the order doesn't end up in limbo in someone's in-basket. Good groupware systems will provide modeling tools and perhaps AI-based consistency checkers to assist in the building of consistent processes. They will also provide tools for builder/users to define work transactions peculiar to the business — bug fixes, subscription renewals, phone calls, sales call reports.

The resulting system manages two sets of information: transactions and status. (In the same way, you have a generral ledger, recording transactions, and a balance sheet, recording status.) Groupware also keeps track of the various incomplete "transactions" — a request not responded to, a promise unfulfilled, an alarmingly high inventory of unfinished tasks in the virtual in-basket of a new team-member. How many fund requests are waiting for Benjamin's approval? What's Charles's ratio of cold calls to follow-ups this week? Who's responsible for the next contribution to the marketing plan? Who gets the plan when Samuel approves it? Who keeps delegating work to the clerical staff? What happened to the DRAM lease proposal?

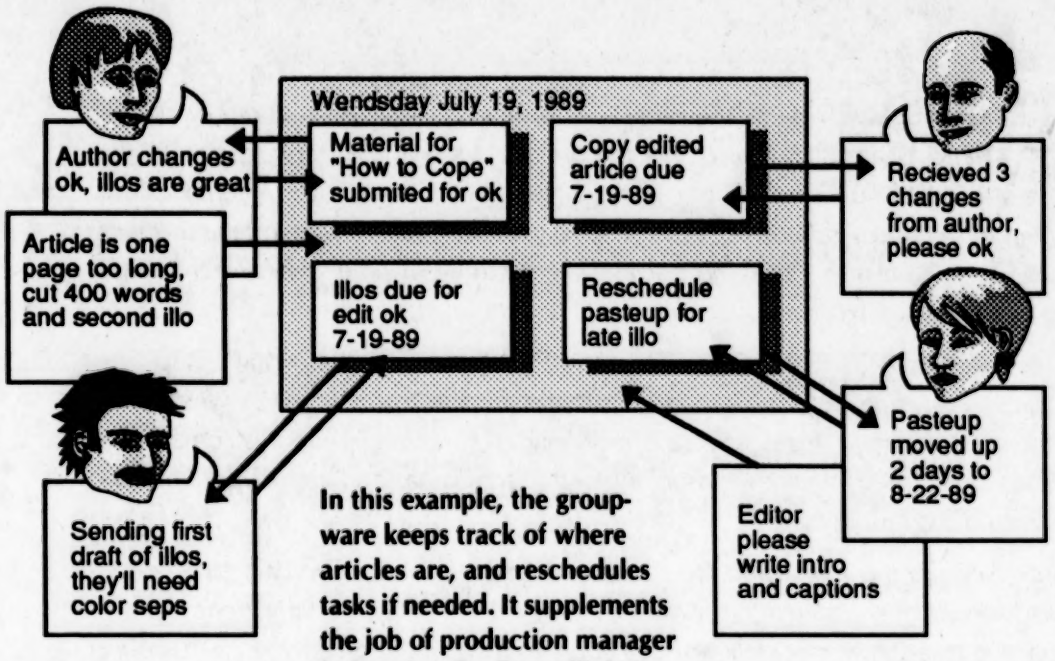
Without transactions, in database systems or in groupware, we'd have no assurance of integrity. For example, databases generally don't allow people to edit data; they must update it through approved transactions. Someone could come in and erase our bank account without crediting us for the money; Juan could delegate a task to Alice without Alice accepting responsibility for it.

To illustrate: We saw such a system recently, a project management system wanting to become groupware. As a project manager it was handy: A manager can define an objective, break it down into tasks and specific actions, assign those to individuals, and monitor their progress. But he could change those assignments by typing in new ones; there is no process to go through. Moreover, there is no provision for interaction among the people doing the work; they all report to the manager. The tool was a manager's monitor rather than a groupware tool.

A peek inside

The concept of transactions described here is a general one; over the next few years, we'll see a variety of tools and a variety of approaches. We're early in the process of defining what a transaction is and should be, and there are likely to be furious arguments about it, rather than the gradual uncovering of a single truth. It's the same with object-oriented databases; there's still too much to discover before we can even hope to create standards. The things that need standardization are awesomely complex.

Aside from transactions, groupware also has its analog to data types — people's roles, generally linked to the kinds of transactions they may or must perform. The data structures are relationships among people: owner/user, requester/fulfiller, coordinator/members, assigner/doer, proposer/approver, etc. Multiple workgroups may co-exist, with the same people playing a different role in each.



In this example, the groupware keeps track of where articles are, and reschedules tasks if needed. It supplements the job of production manager in keeping the flow efficient.

Underneath, of course, groupware relies on the same old technology — networks, server OS (OS/2 or UNIX or a jury-rigged DOS, generally), E-mail, remote procedure calls, shared database access, relational or object-oriented or text database management systems, etc. Groupware tools build reusable logical constructs on top of these that make it easier to build groupware applications — people, tasks, workgroups, transactions, etc. — without worrying about the system underpinnings.

The better we understand group work and can make its activities explicit, the better we can model it on computers. As we discover the underlying concepts, it also becomes easier to build extensible tools rather than applications that model only a single situation (such as the early joint-editing tools). For example, Coordination Technology originally designed its product as a scripting tool, a language plus data structures; after working on the problems for a couple of years, it discovered that it had abstracted out enough common constructs to offer templates and mostly menu-driven procedures which users could customize and assemble into groupware applications.

VisiGroup?

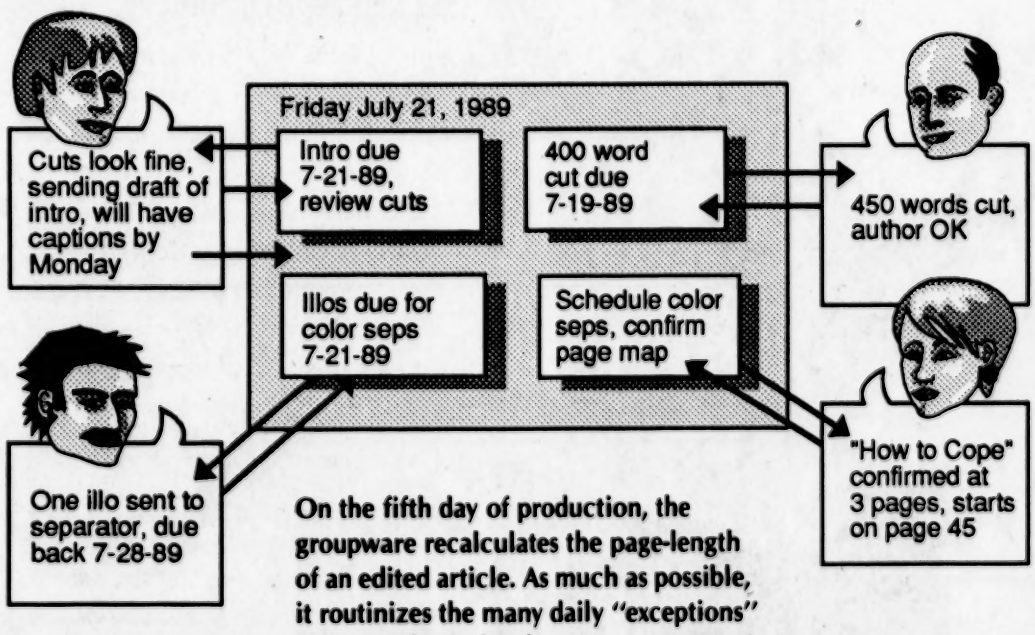
Precisely because groupware is so abstract, it will be valuable to develop metaphors or graphical constructs that can render group dynamics clear and group interactions easy to model. Perhaps the simplest rule of groupware design is: follow the paper. Many interpersonal transactions occur by way of a buck slip. (Why is it that it's easier to give someone a spreadsheet to work on than an order? Because you can pretend you're sharing information rather than giving the order.)

In this context, we remember the commotion we caused every time we released an organizational chart at *Computer Industry Daily,* a previous employer. Somehow everyone imagined that they reported directly to the top; the clear, explicit information in the chart wasn't always welcome — but it ensured that misunderstandings were resolved early!

Beyond bureaucracy?

How many of the business procedures that we've evolved are due to the difficulties of doing things, and how many inherently make sense? Users of Lotus Notes, for example, first appreciated its ability to help them schedule meetings. They soon found an even greater benefit: frequently, it eliminated the need for meetings.

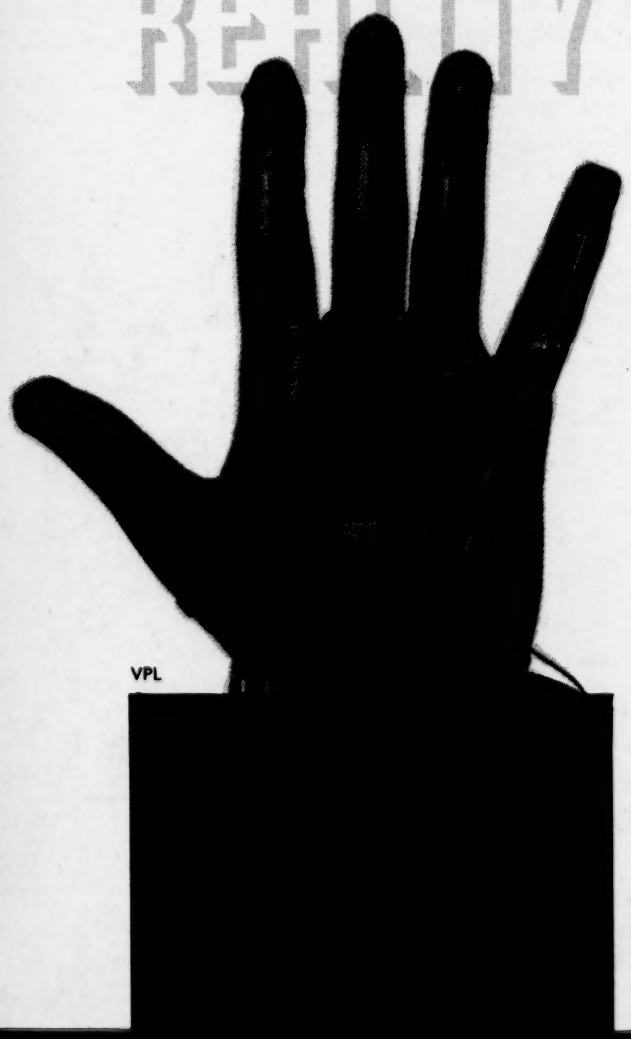
The long-term impact of groupware should be to reduce the height of corporate hierarchies, and all the overhead, miscommunication and heartbreak that they invariably engender. As workgroups extend outside companies (ask Novell or GM about this), we may see fundamental changes in corporate structure and the ability of small companies to operate in a world of large ones. Yes, groupware is about bureaucracy, but bureaucracy, like law, protects us as much as it restricts us. The problem with most bureaucracies is that they cannot handle exceptions, because the exceptions are not defined. The more we can define, the more we can handle. Good groupware is about coordination of ad-hoc activities, not rigid structuring of people's time. Good groupware will free us to address more interesting matters by handling the routine ones automatically. ■



On the fifth day of production, the groupware recalculates the page-length of an edited article. As much as possible, it routinizes the many daily "exceptions" in a complicated task.

AN INTERVIEW WITH JARON LANIER

VIRTUAL REALITY



RIGHT BEFORE MY EYES Jaron Lanier built an artificial reality and then climbed into it. Jaron Lanier is one of the principal visionaries of cyberspace (WER #64) or, as he prefers to call it, "Virtual Reality." One night recently I went down to his offices in Redwood City, CA, to gather up illustrations for the following interview with him. It was an historic evening; for the first time someone created an instant fantasy world and crawled into it. I went in after him.

There are about 20 groups (primarily in the States) working on building virtual realities. Last issue we reported on the progress of the group at NASA which had succeeded in putting together a system of helmet, glove, and a monochrome three-dimensional "stick" reality. A group in North Carolina has also come up with advanced models, in color.

Jaron Lanier is the guy behind the dataglove that NASA uses. The dataglove reproduces your real hand into a virtual hand by means of flexible fiber-optic cables attached to a lightweight glove you slip your real hand into. When you point, your virtual hand points. It's very elegant. Lanier's company, VPL, is developing the concept of the glove into a whole bodysuit. The clothing so far is not elegant. It's made bulky by cumbersome cables growing off the limbs and the back.

VPL has a production model of a virtual-reality goggle, which they are calling "eyephones." The night I was there they were trying out the first one off their very small production line (one-per-day capability). The goggles seem to need much fine tuning. They haven't gotten to the point where they are able to adjust them easily or greatly, so when a new person puts them on there is some time spent fiddling. My eyes do not align properly in the best of times, so they were unable to adjust the vertical alignment of the stereo images. I had to strain to make the 3D image work (which I often have to do with stereoscopic images). The goggles are also heavy, leaving an indented line in your forehead when you take them off.

I had considered the NASA wire-frame worlds as "state-of-the-art" and was not expecting the field to advance so far so quickly. The virtual worlds VPL has created are in full technicolor with shaded, contoured surfaces! They are far from photographic quality, yet there is a sense of completeness. It seems a real world, in the sense that a Disney cartoon seems real. ("Real" is going to become one of the most relative words we'll have.) Overall, I'd say the impression is of being a 'toon in Toonland. The visual quality of the world shown on the outside monitors is attractive — about the resolution of your run-of-the-mill computer animation. The quality inside the goggle is quite a bit less, a little fuzzier, and without the same color subtlety. The images look to me about like what I'd see on a small color TV that had seen better days. The virtual-reality images are produced by two Silicon Graphics computers about the size of oversize luggage — one for each eye.

When I arrived in the evening, Lanier was working on his "reality built for two," fine-tuning it for an upcoming public demo for the Pacific Bell telephone company. In this world two people wear body suits with datagloves, goggles, and ear phones. The virtual space they are in is a triangular room with a poster-size PacBell logo hovering in one corner, and a cluster of small multicolored triangles buzzing around the place like a hyperactive Tinkerbell. You can reach out and grab the cluster, yank it to where you want, and release it like a bird. So can the other person, and when she does, you see her do it in the virtual world. You see the other person as a computer-generated figure, a female called Joan, but she could be represented in almost any form, as Jaron points out in this interview. (I never saw who or what I looked like. Virtual mirrors are a future certainty.)

As impressive as this demo was, I didn't really perceive the magic of what Jaron is speculating about until he showed me the first personal instant world. When I first arrived at 8:30 in the evening, Jaron said he wanted to make up a world for me — a crazy, imaginative world. He claimed that they had been so busy inventing hardware and developing the software that he hadn't had any time to fool around making worlds since they got the system going in the last few weeks. He immediately sat down at his Mac and began creating it.

He used an off-the-shelf graphics program called Swivel 3D ($400; 415/543-3848), developed by VPL, to draw a floor plan of his world in color. It was a wild arabesque floor — large green, brown and maroon polygons and star-shaped tiles. On that he built chalk obelisk pedestals with immense ruby gems perched on top, and twirling orange flames issuing out of them. In the center were several large green fronds that looked more like immense green tapeworms if you thought about it, but worked nicely as fern plants if you didn't. He drew all these using the usual Mac painting tools while I was photographing the hardware and other illustrations. In about two hours he was done making a new world. He rushed his floppy over to Chuck, the hacker on the Silicon Graphics machines, who began loading it into virtual reality.

Jaron put on his helmet and entered his instant world. Very soon he was on the carpeted floor, sprawled with his mouth open, slowly writhing into a new position to explore some hidden aspect of his tiny, newly hatched, and unnamed universe. He found that he could get in between the layers of patterns on his floor and sort of float between the maroon stars and the green and brown polygons. He was worming over the carpet looking for unusual perspectives and exclaiming in delight when he found a curious view he hadn't expected. The rest of us stood around and watched the monitor to see what he saw. One by one we took turns trying on the magical goggles. Each of us would put it on and slowly melt as if in a stupor, stalking in slow motion until we wound up laid out on the carpet, or huddled in the corner constrained from exploring any further by the actual walls of the room. Jaron's girlfriend, still wearing a blue bodysuit from an earlier demonstration, let out quiet yelps of amazement when she discovered that the chalk pedestals were hollow and that you could go up inside them and see the bottoms of the rubies! "This is the Guinness world record for the craziest virtual world yet!" Jaron squealed. You have to keep in mind that most of the research to date has been done by the military.

It was late, 11:30 p.m. The blue figure of Jaron's girlfriend on the floor was strangely rotating, slowly trying to find "the right place," moving to a distant, internal logic. Jaron was on the floor, too, twirling his massive rastafarian dreadlocks. The room had the leftover aura of psychedelics. "Well, I'm addicted," I suggested after I'd had my visit to his tiny dreamland.

"Please don't use that word with this," Jaron asked softly. "Look what happened to mushrooms." The ensuing conversation revealed that some of his old friends, as well as his girlfriend, have done scholarly research in legitimate uses of pyschoactive drugs, only to have their research careers halted by the reclassification of the substances as illegal. He was highly amused that some of them, like Terence McKenna, were appearing in this issue along with his interview. "I'm really worried that virtual realities may become illegal," Jaron sighed.

I'm inclined to agree that virtual realities may be that powerful. I'm running this interview at its full length, because nowhere else have I seen that power so accurately and compassionately described.

Where are the visionaries of the next generation? Here's one of them. Jaron Lanier is 29, without a high-school diploma even though major universities are unable to keep up with his research, and a dedicated musician who wanted to play a guitar without the physical guitar. He is interviewed by Adam Heilbrun, a technical writer and translator in Portuguese, French and Persian, and Barbara Stacks. —*Kevin Kelly*

It's a world without limitation, a world as unlimited as dreams. It's also a world that's shared.

VPL

The wearer of this VPL bodysuit is transported into an alternative, computer-generated world. Fiber-optic cables running through the suit and gloves (far left) produce signals when flexed.

ADAM HEILBRUN: *The word "virtual" is computer jargon. Could you clarify it for those unfamiliar with the concept?*

JARON LANIER: I know. I don't like it either; too tech-y, but so far I have not been able to come up with anything better. "Virtual" means something that exists only as an electronic representation, which has no other concrete existence. It's as if it were there even if it isn't. It's not necessarily the right word. I like it better than "artificial." I like it better than "synthetic." "Shared Dream," "Telereality" — I don't know. I don't like it. I think it sounds nerdy but nothing better's come along. I don't know what to call it. Some people call it "cyberspace" after William Gibson, but I think that's dreadful. It's very limiting and even more computery.

Virtual Reality is not a computer. We are speaking about a technology that uses computerized clothing to synthesize shared reality. It recreates our relationship with the physical world in a new plane, no more, no less. It doesn't affect the subjective world; it doesn't have anything to do directly with what's going on inside your brain. It only has to do with what your sense organs perceive. The physical world, the thing on the other side of your sense organs, is received through these five holes, the eyes, and the ears, and the nose, and the mouth, and the skin. They're not holes, actually, and there are many more senses than five but that's the old model, so we'll just stick with it for now.

Before you enter the Virtual Reality you'll see a pile of clothing that you have to put on in order to perceive a different world than the physical world. The clothing consists mostly of a pair of glasses and a pair of gloves. Exactly what clothing there will be it's too early to say. There are a lot of different variations that are possible and it's really too early to predict which will be the most popular ones. A minimal kind of Virtual Reality outfit would have a pair of glasses and a glove.

The glasses allow you to perceive the visual world of Virtual Reality. Instead of having transparent lenses, they have visual displays that are rather like small three-dimensional televisions. They're much more sophisticated than small televisions, of course. They have to present a three-dimensional world to you that's convincing, and there's some technology involved in accomplishing that, but that's a good metaphor. When you put them on you suddenly see a world that surrounds you — you see the virtual world. It's fully three-dimensional and it surrounds you. As you move your head to look around, the images that you see inside the eyeglasses are shifted in such a way that an illusion of movement is created — you moving while the virtual world is standing still.

The images come from a powerful special computer which I like to call the Home Reality Engine. It will be sitting there in your room and will plug into the phone outlet. I'll say some more words about the Home Reality Engine in a second, but let's stay with the glasses for now.

At the end of the stems they have little headphone speakers very much like a Walkman, which allow you to hear the sounds of the virtual world. There's nothing too unusual there; they're just exactly like your everyday Walkman speakers. The sounds you hear on them are a little bit unusual in that they're processed to have three-dimensional quality; they come from certain directions.

The glasses do one other thing too; they have sensors in them that can sense your facial expression. This is very important because you are a part of the Virtual Reality and the clothing that you wear has to sense as much as it can about your body. It uses that information to control the virtual version of your body, which both you and other people perceive as being you in the Virtual Reality.

So, for instance, you might choose to become a cat in Virtual Reality. Or anything really. If you're a cat you might very well be wired, so to speak, so that when you smile in the real world the cat that you are in Virtual Reality smiles. As your eyes dart around looking, the eyes of the cat dart around as well. And so the eye glasses also have a function in sensing your face.

The headset, the eyeglasses — they're sometimes called eyephones — you have to remember that we're witnessing the birth of a culture here, so a lot of terms aren't really settled down into being a particular way just yet. I think we have to give the community of people working in Virtual Reality a chance to jostle about these different possibilities before we decide definitely what things are called and exactly what they'll do. But this is a very plausible setup that I'm describing.

You wear gloves on your hands. These allow you to reach out and feel things that aren't really there. The inside of the surface of the glove has tactile stimulators so that when the Home Reality Engine can tell that your hand is touching a virtual object (even though there's no object there) you'll actually feel the object.

The second function of the gloves is that they actually allow you to interact with objects. You can pick up an object and do things with it, just like you would with a real object. You can pick up a virtual baseball and throw it. So it allows you to do things to the world.

It does more than that; the glove also measures how your hand is moving. This is very important so that in the virtual world you can see a version of your hand to see your movements. It's important that you wear clothing that not only transfers sensations to you but measures what your body is doing. The computer that's running the Virtual Reality will use your body's movements to control whatever body you choose to have in Virtual Reality, which might be human or might be something quite different. You might very well be a mountain range or a galaxy or a pebble on the floor. Or a piano . . . I've considered being a piano. I'm interested in being musical instruments quite a lot. Also, you can have musical instruments that play reality in all kinds of ways aside from making sound in Virtual Reality. That's another way of describing arbitrary physics. With a saxophone you'll be able to play cities and dancing lights, and you'll be able to play the herding of buffaloes made of crystal, and you'll be able to play your own body and change yourself as you play the saxophone. You could become a comet in the sky one moment and then gradually unfold into a spider that's bigger than the planet that looks down at all your friends from high above.

Then, of course, there's the Home Reality Engine, a computer that by 1989 standards is very powerful but in the future will just be a regular computer. It

Kevin Kelly

Jaron Lanier.

has a lot of jobs to do. It has to be repainting the graphics that your eyes see, and calculating the sounds that your ears hear, and calculating the textures that your skin feels, all the time quickly enough so that the world is realistic. That's a very big task. It has to communicate with other Home Reality Engines in other people's houses so that you can share realities with other people, and that's a very big task. It's quite a special computer and it makes a Macintosh look like a little speck.

AH: *When you first put on your clothing and become aware of the Home Reality Engine, are you presented with something analogous to the Macintosh desktop, that is to say a work space with tools in it?*

JL: What will probably happen is that the Home Reality Engine will have a capability to scan the room that it's in and so will your glasses. The very first thing that you'll see when you put on Virtual Reality clothing for the first time will simply be an alternate version of the physical room that you started out in. So, for instance, if you are in your living room and you put on Virtual Reality clothing — let's suppose that your living room has a couch, and it has a set of shelves, and it has a window, it has two doorways, it has a chair; it has all these things and it has certain dimensions (walls and ceiling). When you put on your glasses the first thing you'll see is an alternate version of your living room with the same dimensions. Wherever there is a thing in the living room there will be something in the Virtual world. Where there's a chair in the living room there will be a something in the Virtual world. It probably won't be a chair — it

You might very well be a mountain range or a galaxy or a pebble on the floor. Or a piano . . . I've considered being a piano.

very well might be a chair, though. The Home Reality Engine will just do a substitution. The reason for this is that it will prevent you from bumping into anything.

The point is that in Virtual Reality there's no need for a single metaphor, whereas there is a need for a single design metaphor in a computer. We are used to switching contexts in real life. It's normal to be in your living room in which you behave one way and in which you do certain things, and then go to work, say, and you do something totally different, you go to the beach and you're in an utterly different state of mind, and you go into a temple and you're in a still different state of mind. All those places are really different streams of life that we associate with an overall environment.

There's simply no need for one unified paradigm for experiencing the physical world, and there's no need for one in Virtual Reality either. Virtual Reality is not like the next way computers will be; it's much much broader than the idea of a computer. A computer is a specific tool. Virtual Reality is an alternate reality and you shouldn't carry over into Virtual Reality the limitations that are necessary for computers to make sense. It's an absurd limitation. Because what we're synthesizing here is reality itself and not just a particular isolated machine; there are lot more possibilities than with the Macintosh.

Virtual Reality will have the equivalent of directories in computers, but they won't look like directories, of course. There may be giant trellises, trellises a million miles across, that are perfectly lightweight, that you can pull yourself through, that carry with them all sorts of different objects, a veritable museum of different objects that you might explore. You might have one of those that shows up in your room. You might very well have a whole bunch of little buckets, and whenever you put one of those buckets on your head you find yourself inside another world, another universe. There will be things like that.

AH: *Will these buckets be things that you've created yourself or will they come as a software package?*

JL: There will be some starter ones. They would have been created over time communally by the community of users. They would have been started by some of us. You'll certainly make your own after a while.

But the thing that you have to remember is that Virtual Reality is a much broader idea than, say, the Macintosh. Its purpose will be general communication with other people, not so much getting sorts of work done. The Macintosh was conceived as a way of automating desk-type of work, so they used the desktop metaphor. It was quite appropriate and obviously it's been very successful; it was a cultural match.

Virtual Reality is conceived of as an expansion of reality, the provision of alternate realities for people en masse in which to share experiences, and so the types of metaphors that come up are things like cars, travel, different countries, different cultures. For instance, you might very well have a virtual car that you ride around in even though physically you're in one place. It would go through different territories in Virtual Reality so that you could get around them — or transporter booths, perhaps. So you could have geographical metaphors. There might very well evolve a new geography, let's say — a fictitious planet with new continents that you can dive into to find new realities.

In the early Virtual Realities you'll only be able to see the Virtual Reality when you're in it. Later, there will be more sophisticated ones where you can blend Virtual objects and physical objects so that you can live in a mixed reality for a while and be able to see your physical environment as if you were wearing sunglasses but also have nonphysical objects mixed in it. That will be a later stage. We're already developing technology to do that but it's an order of magnitude more complex to pull off.

In Virtual Reality any tool is possible and there will be some wonderful tools. In Virtual Reality your memory can be externalized. Because your experience is computer-generated, you can simply save it, and so you can play back your old experience anytime from your own perspective. Given that, you can organize your experience and use your experience, use your externalized memory in itself, as the basis for what you would call The Finder in the Macintosh. That will be quite a different thing. You can keep whole universes in your pocket or behind your ear and pull them out and look through them any time.

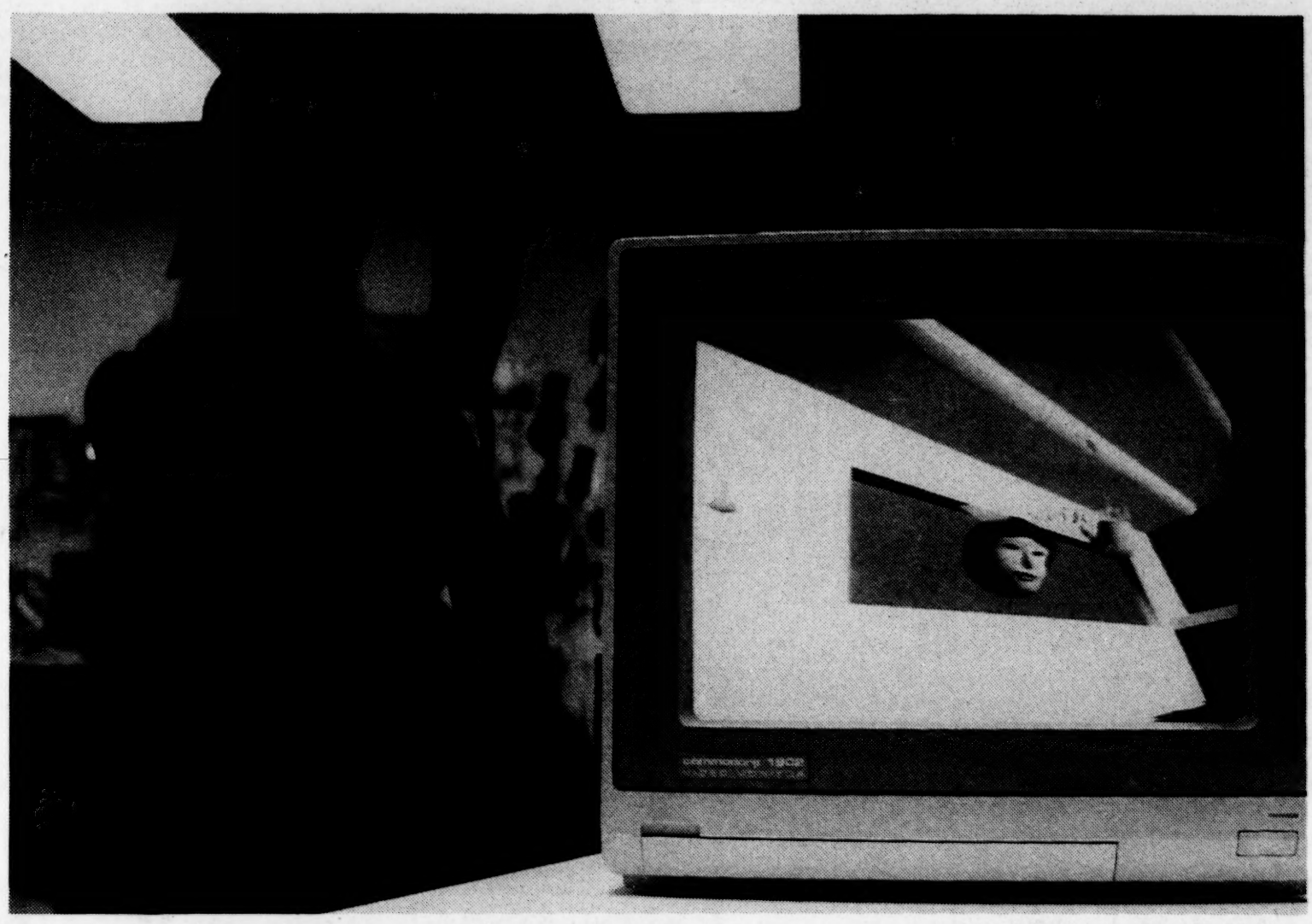
AH: *Mechanically, how do you go about playing back your memory?*

JL: What would you actually do? See, that's a very personal decision. You have to understand that in the Virtual Reality, each person might have very personal idiosyncratic tools that might even be invisible to others, but it's the shared reality that you affect by using your tools that counts. That's what's the most important thing. And it's nice to see each other's tools too; it's rather intimate but it will be fun.

My way of having my memories might be . . . I think I'll keep them behind my ear. I imagine reaching behind my ear and pulling them out in front of my eyes and then I'll suddenly find myself wearing bifocals where I wasn't before. In the lower half of the bifocals I see the virtual world as it is shared and in the upper half I'm looking into my memories of the past. These aren't real bifocals, of course. From now on whenever I refer to anything, I'm talking about virtual things, not physical things.

There may be a machine that looks like the one at the optometrist's where you can flick little lenses into place; there will be this machine that's floating out in front of me, and each of the lenses I can flick into place filters out different aspects of my history. One will say, "Well, filter out everything that wasn't in this room." Another will say, "Filter out anything that wasn't with this other person." And another will say, "Filter out anything that didn't involve music," and so forth. When I flick all these filters into place, I have a narrower and narrower view of my history, so I'm looking at less and less of it. Another filter I might flick into place will order it in different ways. I might want to order it chronologically as I experienced it, or I might want to have it play back sorted according to its geographical distance in the virtual geographic space.

Then I have a little device, a knob that I can turn to go forwards and backwards through my memories and flick filters at the same time. The filters might also change the ways the filters look. For instance, one object might make only certain kinds of things bigger and brighter. Like if I only want to find musical instruments from the past, I might go forwards and backwards through my history and the instruments will be particularly easy to see because they'll be



Kevin Kelly

In a "reality built for two," one visitor wears a body suit with only her head and right hand activated. What she looks like to the other visitor immersed in the virtual room is displayed on the monitor.

bigger and brighter but they'll still be in their context, so I can still rely on my internal memories, which remember things in context.

Of course, I'm somewhat simplifying things because I'm only using the visual metaphor now. I'll have the same thing for tactile and sonic memories. Then, if I see something I want to bring into the present reality, or if I see an old memory that I want to relive in a different way with the people that I'm currently with, we can either pull something out of it (simply reach into that memory and pull it out into the current circumstance) or we can all climb into the memory — either way. It doesn't matter.

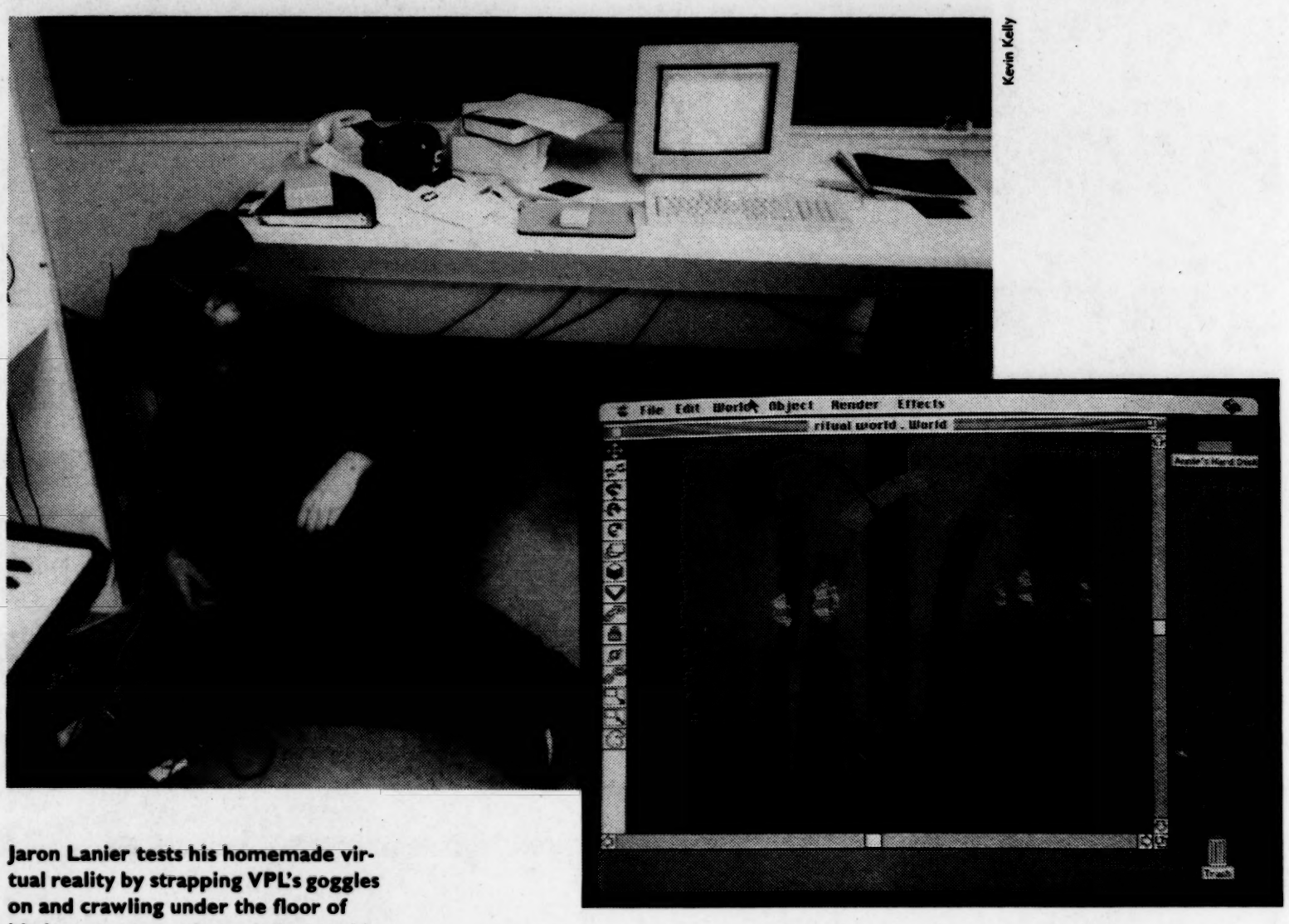
AH: *How did all of these memories get from your mind into the Virtual Reality?*

JL: They never were in my mind. You see, they're memories of external reality. Let's say you're experiencing a few moments in Virtual Reality and perhaps you're sitting on the rings of Saturn — whatever turns you on. Now what's happened is that in order for you to perceive everything you perceived, in order to perceive that you were looking out into the vastness of space and that if you looked behind you there was this huge planet Saturn and so forth, in order to perceive that, the Home Reality Engine was generating those sensations. It was generating the images you saw in your glasses. It was generating the sounds you heard in your earphones. It was generating the textures you felt inside the glove. It can simply store these like any other computer information. There they are. You can play back exactly what you experienced. Experience becomes something you can store in a computer file.

I know that might sound rather cold. I'm the first one to criticize this horrible substitution of information for human experience. I think information in itself is a dreadful concept. It robs us of the richness of life. It robs us of the act of the joy of each moment and the mystery of the next. But it is simply true that the external experience, not the internal experience, but the external experience of Virtual Reality, is a computer file. And it's that simple.

Now the reason that the whole thing works is that your brain spends a great deal of its efforts on making you believe

You can play back exactly what you experienced. Experience becomes something you can store in a computer file.



Kevin Kelly

Jaron Lanier tests his homemade virtual reality by strapping VPL's goggles on and crawling under the floor of his fantasy room, shown below on his design screen.

Other people are the life of the party in Virtual Reality. Other people are the unique things that will animate Virtual Reality and make it astonishingly unpredictable and amazing.

that you're in a consistent reality in the first place. What you are able to perceive of the physical world is actually very fragmentary. A lot of what your nervous system accomplishes is covering up the gaps in your perception. In Virtual Reality this natural tendency of the brain works in our favor. As soon as there's a threshold, the brain will tend to think of either the physical world or the virtual world as being the reality you're inside of. But as soon as the brain thinks the virtual world is the reality you are inside of, all of a sudden it's as if all the technology works better. All variety of perceptual illusions come into play to cover up the flaws in the technology. All of a sudden the world becomes much more vivid than it should be. You perceive things that aren't there. You perceive the resistance of objects that actually have no mass as you try to push on them, and things of that kind.

AH: *Shouldn't you be able to talk within your environment? Current voice-recognition technology isn't very impressive.*

JL: Well you should be able to and it would be a nice thing but it's not central at all. In fact, it's pretty superfluous, at least the way I think about Virtual Reality. I'm pretty sure that it will turn out to be a not-very-important aspect of it. It would take a while to explain why, but I suppose I should!

There are a few special things about Virtual Reality to keep in mind, the things that make it important. One is that it's a reality in which anything can be possible, provided it's part of the external world. It's a world without limitation, a world as unlimited as dreams. It's also a world that's shared, like the physical world. It's as shared and as objectively real as the physical world is, no more, no less. Exactly how shared or real that is, is open to question, but whatever the physical world has Virtual Reality has as well. The thing that's remarkably beautiful to me about Virtual Reality is that you can make up reality in Virtual Reality and share it with other people. It's like having a collaborative lucid dream. It's like having shared hallucinations, except that you can compose them like works of art; you can compose the external world in any way at all as an act of communication.

The question is: well, given that you

have a world where you can change it, how do you change it? Do you just talk to it and does it become the way you say it should be? Or do you do something else? Now, there are real limits to how you can change the world by talking. For instance, imagine that you were trying to teach a robot to fix a car engine and you tell the robot, "Okay now, connect this piece to that piece, turn this bolt and so forth." Well, you can do that to a degree but you can't really do that with a person. You have to show them. You can't run the world with language. Language is very limited. Language is a very very narrow stream through the plain of reality. It leaves out a great deal. It's not so much it leaves things out as that language comes as a stream of little discrete symbols and the world is made of continuity and gesture. Language can suggest things about the world, but no painting could ever be fully described by words, nor can reality.

The way that you can probe the reality is with a special kind of physics that can only exist in Virtual Reality. It's what I call Absolute Physics. For some time now I've been working on software that will be able to make Absolute Physics work in Virtual Reality.

Coming back to the physical world for a second, there are only a very few things in the physical world that you can change fast enough to use as forms of communication. Mostly it's your tongue, and to a lesser degree the rest of your body. Your body is basically the extent of the physical world that you can communicate with in real time, but you can communicate with it as fast as you think. That's the way the body is. But then, beyond that you can change the physical world but you need tools. You can suddenly change a room from being dark to light by turning the switch because the switch is there. Technology in the physical world mostly functions to extend the human body one way or another so that it can be used as a medium for human action. The problem is that the kinds of tools that you can have are very limited. You can't have a light switch that turns day to night or a knob that makes the room suddenly grow or shrink in size. You can have tools that can color your face, but you can't have tools that can change you from one species to another. Basically, all that absolute physics is, is a physics that has any kind of causality at all, so you can have all these tools. Once you have all these tools, you can start, using whatever body you choose to have in Virtual Reality, to use the tools to change the world very quickly in all kinds of ways. Then, you have this idea of being able to improvise reality. That's the thing that excites me the most about it.

AH: *What does the interface look like? If I wanted to turn this cup green, what would I do to make it green?*

JL: Okay, here's the deal. There's no one way. There would be a million ways to change the cup green. You could make up new ones and you could change that one over there. See, the tools that you use to change reality are somewhat private. It's the *result* of the change in reality that's the more social thing. People will be somewhat idiosyncratic about that.

Now the way you turn the cup green would probably be with some kind of little coloring device. The kind of coloring device that I'm going to have is a little wand thing, a little prism that I pick up. I turn it and it reflects the rainbow of my eyes. Whenever the color looks right I'll squeeze it and whatever it's pointed at will turn into that color. That will be my personal one; you might want something completely different.

AH: *We are witnessing a breakup of consensus reality in the external world right now. The political repercussions seem rather frightening as large segments of society have no common ground, no shared assumptions about reality. Will Virtual Reality not further undermine consensus reality?*

JL: It's a complicated question with many, many angles to it. Let me just cover a few. One is that it's important to understand that notions of consensus reality are of a different order than what Virtual Reality is. Consensus reality involves a series of subjective realities and Virtual Reality only addresses objective reality, that is, the shared reality that is external to the senses. But there is interaction between the two on many levels.

Another angle is that idealistically, I might hope that Virtual Reality will provide an experience of comfort with multiple realities for a lot of people in western civilization, an experience which is otherwise rejected. Most societies on earth have some method by which people experience life through radically different realities at different times, through ritual, through different things. Western civilization has tended to reject them but, because Virtual Reality is a gadget, I do not think that it will be rejected. It's the ultimate gadget. It's the culmination of gadgetry in many ways. I think that it will bring back into western experience something that has been lost. Why that is so, is a big topic.

It will bring back a sense of the shared mystical altered sense of reality that is so important in basically every other civilization and culture prior to big patriarchal power. I hope that that might lead to some sense of tolerance and understanding. But there's more to it than that. I often worry about whether it's a good technology or a bad technology. I have a little benchmark I use for that. I believe that if a technology increases human power or even human intelligence and that's its sole effect, then it's simply an evil technology at birth. We're already both powerful enough and smart enough to accomplish a great deal. All of our problems are self-brought at this point. If the technology, on the other hand, has a tendency to increase human communication, human sharing, then I think it's a good one overall, even though there might be many ways it could be used badly. My chronic examples of these are that the television is bad but that the telephone is good. I could go on about that forever.

I do hope that Virtual Reality will provide more meeting between people. It has a tendency to bring up empathy and reduce violence, although there's certainly no panacea ultimately. People simply have to grow up and that could take a long time, too long.

There are some other levels of interaction, too. You see, Virtual Reality starts out as a medium just like television or computers or written language, but once it gets to be used to a certain degree, it ceases to be a medium and simply becomes another reality that we can inhabit. When it crosses over that boundary it becomes another reality. I think of it as acting like a sponge where it absorbs human activity from the physical reality plane into the Virtual Reality planes. To the degree that that happens there is a very beneficial asymmetry that comes into play. When Virtual Real-

Kevin Kelly

Early attempts to monitor the movements of a hand hang on the wall of VPL, forming a fossil record of the data-glove's evolution.

You can't really ask what the purpose of Virtual Reality is because it's just too big. You can ask what the purpose of a chair is because it's a small enough thing to have a purpose.

ity sponges up good energy from the physical plane, then what you get in Virtual Reality is beautiful art, beautiful dance, beautiful creativity, beautiful dreams to share, beautiful adventures. When Virtual Reality soaks up bad energy from the physical plane, what we get is some decrease, however small, in violence and hurt on the physical plane in exchange for events on the Virtual plane which, while they might be uglier, are of no consequence whatsoever because they're virtual.

BS: *Unless they're syndicated, in which case they are educational propaganda. And don't they have consequence in that they further brutalize the participants?*

JL: Well, physical reality is tragic in that it's mandatory. Virtual Reality is multiple channel. People can choose and switch which Virtual Reality plane they're on. They can also simply take off their clothing if they want to get out of it. It's easy to take the physical world for granted and forget that you're inside it. (Well, that's a hard comment to explain.) It's harder to forget that you're inside of Virtual Reality and therefore it's harder to suffer it. You can simply take the clothing off.

AH: *One of the images that haunts me is growing up watching Tom and Jerry cartoons, where in an alternative reality you can see somebody squashed by a steamroller and then pop up and be whole again. I think having absorbed so much of that kind of imagery has numbed us. We have become a generation that is unaware of the pain of others.*

JL: Virtual Reality is a very different situation than movies or television. I'm going to say something roundabout but it comes back to exactly the point you're bringing up. Movies and television are, first of all, broadcast media, so one facility has to generate the material that you see. Furthermore, it's very expensive to generate this material so very few people are in a position to do it. Therefore, the material becomes supernaturally remote and universal. It has a numbing effect on people and it reduces empathy. Television ultimately reduces empathy because people live in a world in which they can't act or have responsibility or meet each other. The shocking statistics about the number of hours that people in the United States spend watching television explain, I think, all too much about our actions in the world and our lack of empathy. When a person chooses to spend that much time watching television, it's equivalent

to death as far as society is concerned. They cease to function as a responsible or social person during the time that they're simply perceiving media.

Now, Virtual Reality is just the opposite. First of all, it's a network like the telephone where there's no central point of origin of information. But, much more importantly, since nothing is made of physical matter, since it's all just made of computer information, no one has any advantage over anyone else in their ability to create any particular thing within it. So there's no need for a studio. There might be occasional needs for one, if somebody has a bigger computer to generate a certain kind of effect, or certainly if somebody's assembled people of a certain talent or reputation. But in general there's no built-in difference from one person to another in terms of ability to create.

This means that there's going to be such a profusion of different forms. There will be movie studios that get involved in making Virtual Realities, but I think more there will be little entrepreneurs who will be like Reality Troubadours who will travel about spinning realities, if anything. What'll happen is that there will be such an enormous variety of form that "things" will become cheap. Basically, in a Virtual Reality everything is in infinite supply, except for one mysterious thing called creativity. And time, certainly, and health, and other things that are really still inside your body. But in terms of external things, they're infinite and wonderful and abundant and ever-varied and all equally valuable because they all can be made as easily.

So what really is of value, what really will stand out as a foreground against a background in Virtual Reality is quite different than what stands out in the physical world. In the physical world mere excess or novelty will often make something stand out. A thousand-dollar bill will stand out in the physical world. In the Virtual world there is absolutely no difference between a thousand-dollar bill and a one-dollar bill; they are simply two different graphic designs and they are both as plentiful as you can make them.

Other people are the life of the party in Virtual Reality. Other people are the unique things that will animate Virtual Reality and make it astonishingly unpredictable and amazing. Personality will be accentuated since *form* will be so cheap; since form will be so non-precious, personality will be quite accentuated.

A good experiment to do is to observe somebody watching television. They look like a zombie. Then watch somebody using the telephone and they look animated. The difference is that one is a social medium and the other is a broadcast medium. In the social medium they're interacting with people. Virtual Reality is like that, more so than any medium ever has been, including, I believe, things like spoken language. And so you'll see people activated and animated. When people get social and see each other, especially in a context that will be so, let's say, "illuminating" in a sense . . . Virtual Reality is the ultimate lack of class or race distinctions or any other form of pretense since all form is variable. When people's personalities meet, freed of all pretense of that kind in the virtual plane, I think that will be an extraordinary tool for increasing communication and empathy. In that sense it might have a good effect on politics.

You can't really ask what the purpose of Virtual Reality is because it's just too big. You can ask what the purpose of a chair is because it's a small enough thing to have a purpose. Some things are just so big that they become the context, or they become the problem.

AH: *That is what we mean by a paradigm shift.*

JL: I think Virtual Reality will have an effect of enhancing and, in a sense, completing the culture. My view is that our culture has been abnormally distorted by being incredibly molded by technology, but when technology was young. I mean, television is a weird anomaly that will be remembered as a bizarre technology in the 20th century, and Ronald Reagan could only exist in television. We have to remember that we're living in a very peculiar bubble. Virtual Reality, by creating a technology that's general enough to be rather like reality was before there was technology, sort of completes a cycle. I think the reasons for having Virtual Reality are everything. There's recreation, there's education, there's expression, there's just pure work, there's therapy — all of those things. All of the same things that you'd find in language or physical reality or any other very large human pursuit.

AH: *Could you give us some idea of the state of current prototypes and how far down the road until I'll have a virtual reality device in my own home?*

JL: Well, it's very early right now. We're in the same stage with Virtual Reality that computer science was in the very earliest days. We're about in the same place computer science was back in 1958 or 1960 perhaps. The systems being built were rather large and special-purpose. Only institutions could afford them. But that will be changing, and it will be changing much faster than it did with computers. The first headset, the eyeglasses, were invented in 1969 by Ivan Sutherland, who was also the founder of Computer Graphics. Actually, Marvin Minsky, the founder of Artificial Intelligence, did make a pair in 1965, but the person who really got the whole thing going was Ivan Sutherland. The glove was originally invented by Tom Zimmerman. The current glove was designed by Young Harvill. Both of those people are from VPL.

Right now, all of the basic components I've described exist, although in rather crude forms. The overall system works, although in a rather crude form. The best ones are behind locked doors in defense contracting companies and probably have no bearing to any real conversation about the subject. The most fun one that's working as a complete system is the one at NASA Ames, which is called the View Lab. It was put together by Mike McGreevy and Scott Fisher. VPL has some wonderful surprises in store, but part of the fun is not telling just yet.

You'll start to be able to experience Virtual Reality within a few years. There will be Virtual Reality rooms at universities that students can do projects in. I think there will be rather spectacular amusement park rides that will be tacky and not really worth bothering with. I've toyed with the idea of opening a Virtual Reality Parlour that would be a little bit more civilized. It would be sort of like a salon scene where people could have Virtual Reality conversations and have wild experiences, but they would be collaborative. It wouldn't be like an amusement park, some dumb experience designed to get you to

drink a certain soft drink and see a certain movie and buy certain clothes, but rather would be a Virtual Salon. I think that would be very nice. Perhaps we'll see something like that in a few years. I hope so. I think so.

A few years is a little bit vague, but I have to be because there are so many unknowns. But in three to five years, let's say, these things will be around. They'll be too expensive to have in your home, but a lot of people will be able to experience them through those institutions and businesses. On the other hand, Mattel has licensed the data glove from VPL and is marketing an inexpensive version as a Nintendo controller.

In terms of actually having them in your home, I see it as being roughly around the turn of the century when that will start to happen. It won't be so much that you buy a set of reality clothing as that it will be through the phone company. They'll own the clothing itself or they'll own parts of it and you'll own other parts.

Right now it's rather expensive, but at the turn of the century I don't think it will be. You'll pay for the time that you use it in very much the same way the telephone was introduced. I see the telephone, from a business point of view, as being an extremely analogous kind of technology. Now telephones are so cheap that you go ahead and buy them. Originally, the telephone company continued to own the equipment and made the money off of your phone bill.

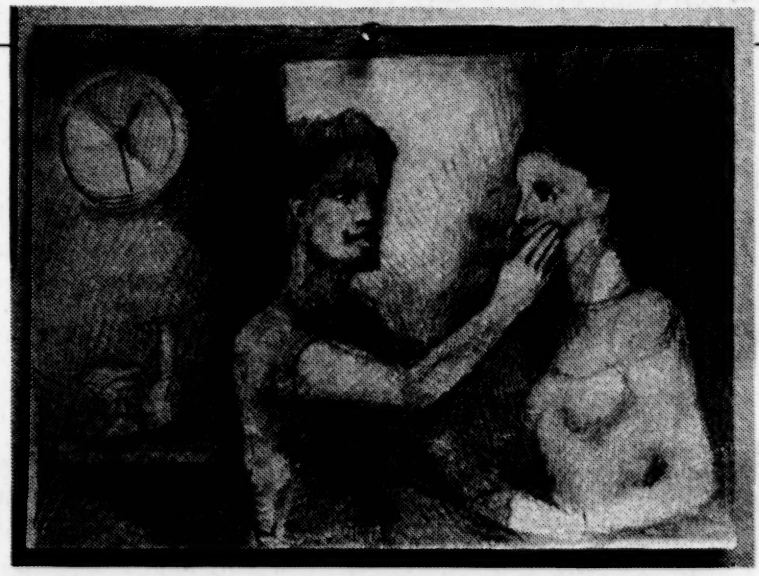
In a few years we will see medical Virtual Realities, where handicapped people can experience full-motion interaction with others, where people with movement disabilities or paralysis will be able to experience a complete body.

Another medical use is having surgery simulators so surgeons can enjoy the same benefits that pilots do and learn without putting lives at risk. Of course, surgeons can do that with cadavers, but it's not the same thing. A cadaver isn't the same thing as a body that really reacts, that can really bleed. You can't really make mistakes on a cadaver. There are people that are actively pursuing this. There's Dr. Joe Rosen at Stanford and Dr. Robert Chase, who are both looking at the problem from different angles. Joe Rosen might also be familiar to some people as the inventor of the nerve chip, but that's another story.

Another area is having miniature robots that could enter the human body. They would have microcameras and tiny hands. You would transfer your actions to the robot and the robot would transfer its perceptions to you so that you'd have the sensation of being inside the patient's body performing microsurgery. There are actually people now working on this technology. I'm sure none of the current projects will be the ones that work, but it is already something that people are attempting to do, and I'm sure that we'll see that sometime. I think that it will be working by the end of the century.

AH: *Are there any historic images that come to mind that set the stage?*

JL: Oh many, many. God, that's a huge



Two early drawings by VPL visualizing the power of virtual reality.

Communication without symbols

JARON LANIER: Let's suppose that you could have a time machine go back to the earliest creatures who developed language, our ancestors at some point, and give them Virtual Reality clothing. Would they have ever developed language? I suspect not, because as soon as you can change the world in any way, that is a mode of expression of utter power and eloquence; it makes description seem a little bit limited.

There's an idea that I'm very interested in called post-symbolic communication. This means that when you're able to improvise reality as you can in Virtual Reality, and when that's shared with other people, you don't really need to describe the world any more because you can simply make any contingency. You don't really need to describe an action because you can create any action.

I've been working on a whole description of what it might be like to communicate without symbols. It has a different rhythm. For instance, in symbolic communication, you have the notion of question and answer and this kind of repartee which defines the flow of communication. In Virtual Reality, since people are collaboratively changing a shared reality as a means of communication, what you'll have is nodes of relative static quality vs. periods of very dynamic quality. There will be this rhythm between when the world is being changed quickly and when it sort of settles down. That rhythm is something like what a sentence is in language. In spoken language you have the phenomenon of searching for the next word and going, "Um . . . um . . ." The same thing will happen in Virtual Reality, where people will go through an interval of spacing out from the reality, preparing their next change to the shared world.

I can point to the direction of what it might be like in the general sense, but it's almost by definition impossible to make completely compelling examples. I'll give you a few, though.

If we think of an experience where you're describing something to someone else — let's suppose you're describing what it's like to live in the East Coast in these grungy violent cities and how you have a completely different set of expectations vs. living in what seem to be the rather safe and lovely but rather bland and aimless cities of California — now to describe those things . . . I just did that. I just came up with some brief symbolic descriptions of what cities in New York and California are like. In Virtual Reality there's the possibility of simply playing back one's memory with the person from the other city inside it. When you have external reality at

question too. There are the lost memory arts, the memory palaces. Most of the western cultures relied on imagined Virtual Realities, these imagined palaces that people hung their memories in as artworks. People would memorize their palaces in order to have a way of remembering things, and before Gutenberg that was a very important thing. It was absolutely as primary as music or the arts of war to a particular culture. The memory arts sort of vanished because they were rendered obsolete. But they were remarkably like Virtual Reality.

So many things come to mind about that. Our attempts to change the physical world. We have raped the physical world because we don't have Virtual Reality. Technology is just our attempt to use the physical world as a means of action. The physical world resists it and therefore we have the ugliness that we live with all the time. But Virtual Reality is the ideal medium for that type of action. Architecture and technology in general — our attempts to modify the physical world as a means of human action — is really the strongest precedent.

Oh, so much more. Some people had attached a stereo camera to a set of eyeglasses with stereo television sets as early as 1955. Some engineers from Philco had it rigged up in a periscope-like setup. There was a stereo camera on the top floor of a building. You could look out through it from inside the building. It had a limited degree of tracking, so you could have the feeling of looking over the side of the building. That was a big thrill back then. It probably still would be now.

BARBARA STACKS: *When I think about what kind of old age is going to be feasible in a society that's going in the way it is going, I feel like I'm going to be locked into a very small room. If I am, I want to be locked into that room with a lot of machines that I love. It will liven up our old age to be connected with people who are spread all over the world. But on the other hand, it will be a good justification for keeping us locked up because after all, we've got our machine. It will be a cheap way to deal with us. . . .*

JL: Yeah, that's certainly a horrible thought. I tell you, the most vivid experience of Virtual Reality is the experience of leaving it. Because after having been in the reality that is man-made, with all the limitations and relative lack of mystery inherent in that, to behold nature is directly beholding Aphrodite; it's directly beholding a beauty that's intense in a way that just could never have been perceived before we had something to compare physical reality to. That's one of the biggest gifts that Virtual Reality gives us, a renewed appreciation of physical reality.

And so, I'm not sure what to say. I'm sure bad things will happen with Virtual Reality; there will be some pain that it plays a part in because it will be a big thing and the world can be cruel. But I think overall it will actually have a tendency to enhance people's sensitivity towards nature, towards preserving the earth, because they'll have a point of comparison. ■

your beck and call to be played back, created, improvised at will, description is simply narrow.

Now, description is interesting because, in its narrowness, it does bring in possibilities for poetry that probably don't exist in the fullness of post-symbolic communication where you can just create experience as a whole all the time. On the other hand, in creating experience as a whole, you have this possibility of a kind of collaboration that you really can't have with symbols, where people can be simultaneously molding a shared reality.

I realize these things are hard to describe, and that's appropriate. What I'm trying to describe is communication that is itself beyond description. The idea might turn out to be wrong; it might turn out that communication without symbols and description is just a silly idea and a path wrongly taken. So it's really a grand experiment, and I think it will be a lot of fun.

Of course communication without symbols already happens constantly. First of all, the clearest example of receiving communication that is nonsymbolic is to commune with nature. The direct perception you have when nature communicates to you as you walk in the forest is simply prior to/beyond symbols. There's no need to prove that.

An example of communicating outwards without symbols is when one moves one's own body. You don't send a symbol to your arm or to your hand; you communicate prior to symbols to your own body. The most beautiful example that now exists of an intense sort of communicating outward without symbols is in lucid dreaming. When you dream lucidly you are aware that you're dreaming and you control the dream. It's rather like Virtual Reality except that it's not shared. The means by which you communicate to your dream are without symbols. There you are spinning the world, spinning anything in the world without symbols, simply making it be.

Now, of course, those are the purified examples, some purified examples of nonsymbolic communication that already exist. But, of course, all of life is deeply imbued with nonsymbolic communication. A book has its nonsymbolic aspects; I mean, a book is a book as an object prior to being a book that can be decoded as a bearer of symbols.

Everything has symbolic and nonsymbolic aspects to it. A thing isn't a symbol; it's just that you can use anything as a symbol. The idea of symbol is a use for a thing, but everything is also a thing in and of itself; everything has a primary thingness. (Twisty sentences like that are part of what led me to the search for post-symbolic communication!) ■

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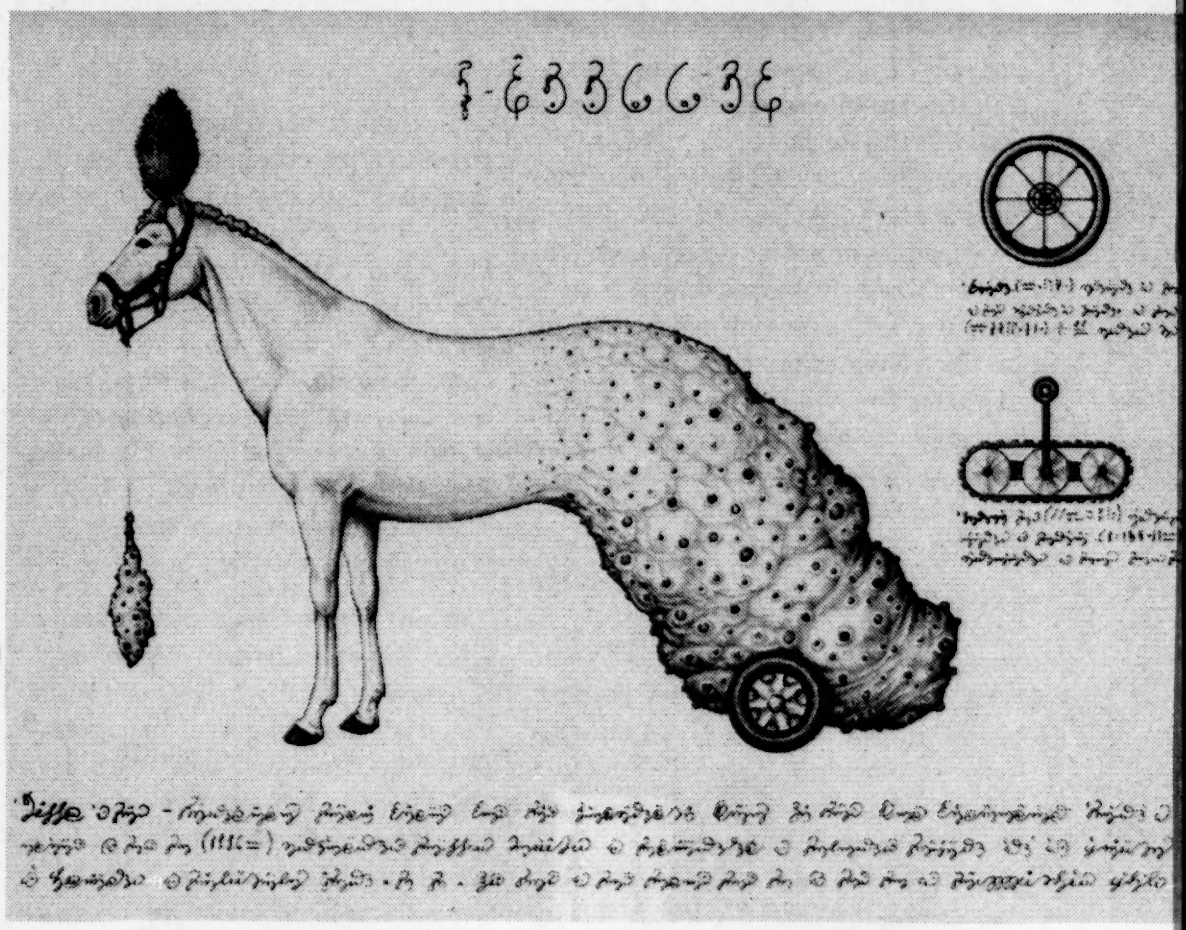
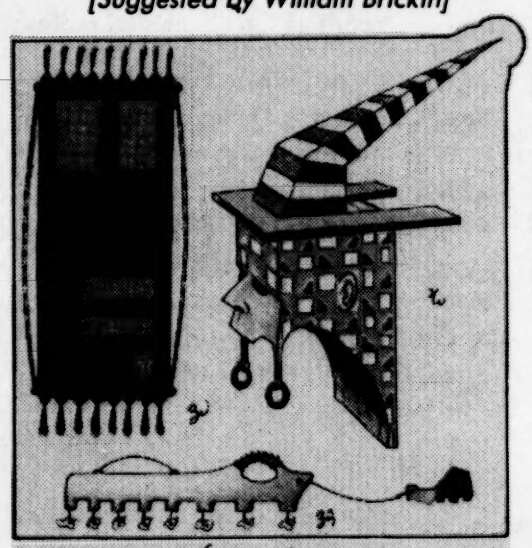
Simply the most extraordinary combination of wit, beauty, and untrammelled ingenuity in print. Hundreds of pages of fey, meticulous colored drawings by one "Franco Maria Ricci" (whose name appears only once in tiny print with the 1981 copyright notice), all explained in detail in an incomprehensible, but elegant, cursive text. There is a universe in this book, a satire on our own, no corner of which will look the same after exposure to Ricci's. The book invites repeated study and rewards it — the more you look, the more there is. I know professional inventors who use the volume as a constantly renewable well of inspiration. —*Stewart Brand*

[Suggested by William Brickin]





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Franco Maria Ricci, 1981; //???/ pp.

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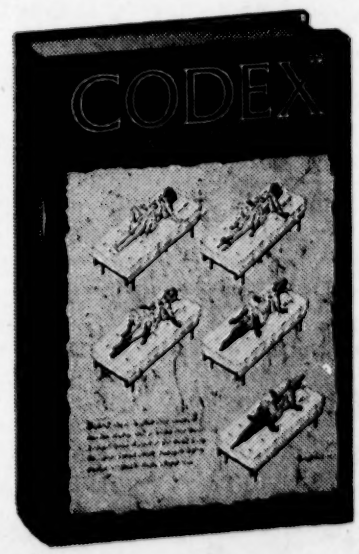

Social Inventions

A collection of briefly stated social innovations and other intriguing ideas submitted and then discussed by the worldwide readers of this periodical from England. It's an intriguing social innovation itself. —*Kevin Kelly*

•

Otters to test river purity *Fred Allen*

An Otter Society could be formed to build a series of artificial holts for otters wherever a river seems unpolluted — (natural holt sites often cause flooding and have been removed). Otters would then become the guardians of the water's purity. Otters, for instance, are excessively sensitive to PCBs in the water. If one in five of the holts were supplied with pet otters and these failed to breed and spread, then this would suggest that the water is PCB polluted.

•

Politics: lottery ticket for voters
Peter Mucci

My idea is to offer lottery tickets to people who vote in elections.

Most local elections, and even some by-elections, poll less than 30-40% of the possible vote, indeed in my days of 'canvassing' and 'telling' we rarely managed to encourage more than 25% of our constituency to go to the polls. Now general elections are better — but a large number still stay at home.

So what you do is offer a high reward to those who both vote and draw a winning ticket from the lottery. The British obsession with gambling will correct their reluctance to support the democratic process. If the act of voting at the polling station is the only qualification for entering the draw (I do not rule out payment for the ticket either), then I predict a major change for the better in British politics — as long as the prize is big enough.

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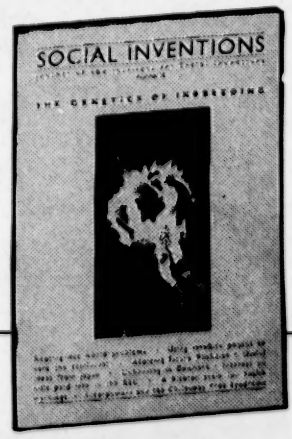


Fire in the Crucible

I've often read biographies of intensely creative people like Virginia Woolf and Albert Einstein, looking for hints I could use. But the stories are so contradictory that genius just seemed like magic until I read ***The Fire in the Crucible****. Briggs doesn't spoil the magic, but he does make it seem a little more within reach.*

Making use of contemporary research on creativity, he digs beneath the surface of geniuses' lives to find a unified theory of creativity. He describes an integrated system of ingredients like vision, talent, absorption, courage, and history.

Equally useful, he exposes a number of fallacies about creative genius, such as the myth of the lone creator. This book is the next step beyond Arthur Koestler's classic, ***The Act of Creation****. Building on the insights of Koestler and others, Briggs brings us closer to that ultimate high — the moment of "Eureka!"*

—Meredith Tromble

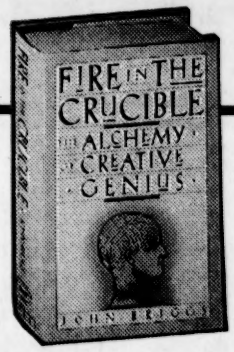
•

Howard Gardner suggests one of the many reasons why IQ has turned out to be such a poor indicator of talent even in mathematical fields where the test seems most suited: "I think what's missed by the IQ and by all short-answer kinds of instruments is that to do anything significant in culture takes a long time. Almost all problems of significance are problems people have been working on a long time. Someone might appear to solve them in a flash but that's only because he's been thinking about it for years. The IQ test is just the opposite. It favors somebody who can glibly shift from one kind of question to the other. And the more you know people who achieve things, the more you know that's not what distinguishes them. What distinguishes them is determination to work something through to completion no matter how long it takes."

•

Holton has discerned that the work of scientific creativity is shaped by clusters of presuppositions and "gut" assumptions which each scientist has about the universe. He calls these gut assumptions "themata": themes. For the most part themata are aesthetic qualities like the assumption that the universe is basically symmetrical, or the opposite assumption that it's asymmetrical. . . .

The cluster of themata differs from scientist to scientist, though most scientists doing what Thomas Kuhn has called "normal" science share basically the same set of underlying assumptions. Scientists who end up revolutionizing their fields appear to have a collection of themata at variance in some significant ways with the theme clusters held by most of their colleagues.



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John Briggs, 1988; 382 pp.

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The Honey Bee

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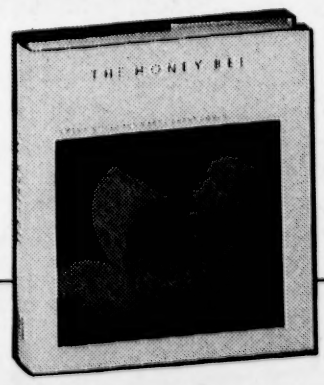
James L. Gould and Carol
Grant Gould, 1988; 288 pp.

$32.95 ($35.45 postpaid) from
W. H. Freeman, 4419 West 1980
South, Salt Lake City, UT 84104;
801/973-4660
(or Whole Earth Access).



Numbers allow researchers to trace the movements of individual bees.

•

It is as if the memory of foragers were organized like an appointment book, with "blue peppermint triangle at site X" written on all the lines between 9:00 and 10:00 A.M., and "yellow lemon circle at site X" entered on the blanks from 10:00 to 11:00; by 11:15, the foragers have moved on to other appointments. This idea is consistent with the curious observation that a forager cannot be taught that two kinds of flowers provide food at the same time of day.

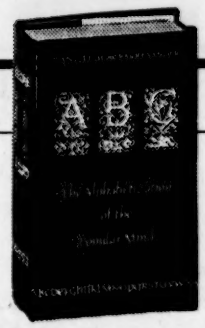
•

As von Frisch first pointed out, there comes a point in the training procedure at which at least some of the foragers begin to catch on to the timing and pattern of the experimenter's movements. As we described in an earlier chapter, we train bees by setting a dish of sugar solution at the hive entrance, then moving it progressively farther away as bees begin to visit it. Each step in the process is in some more-or-less fixed proportion of the previous distance (25 percent farther, typically), and some of the bees begin to anticipate our movements. Characteristically we notice this rather eerie phenomenon when we foolishly delay moving the station while waiting for a tardy bee to return — we say foolish because the trained forager may have been killed, or gotten lost, or have begun dancing in the hive. What happens in these cases is that some foragers fly on past the training station and wait at the spot we are aiming for on the next move. There is certainly nothing in the behavior of natural flowers that is likely to have led to the evolution of circuitry dedicated to guessing where a plant will move next. To us, this looks genuinely clever.

The Alphabetization of the Popular Mind

My mind has been blown completely away three times since I started reading this book two hours ago. It deals with language and history in a wholly different way. It's a book of direct statements; nothing is proved or footnoted. It's two guys who know a lot telling you what they know and what they believe and not apologizing or covering their asses. It explains the bardic tradition in a way that makes it clear to me for the first time. It talks about oaths in a way that makes them clear. It talks about what the invention of writing destroyed, and what it created, and how it happened. It promises (it's a short book; even as dense as it is, a full evening should do it easy) to talk about language, information, the future, ethnic identity, silence, and the notion of self. Wow. —Jon Carroll

[Suggested by Daniel Barth]



The Alphabetization of the Popular Mind
Ivan Illich and Barry Sanders
1988; 166 pp.

$16.95 ($18.45 postpaid) from North Point Press, 850 Talbot Avenue, Albany, CA 94706; 415/527-6260 (or Whole Earth Access).

•

The self is as much an alphabetic construct as word and memory, thought and history, lie and narration. Narration and the self in the twentieth century have become as inseparable as the epos and its singer in oral times: The writer spins the story as part of his self. The twentieth-century citizen sees himself through the eyes of various sciences as a layer cake of texts. From the eighteenth century on, the state has become a corporation of selves that letters examine.

•

The second way letters changed a society — by their own symbolism getting under a culture's skin and changing social perception in terms of the written word — has been much less studied and is much more difficult to talk about. The reason for this research lacuna is probably that all the categories by which we talk about past societies have been acquired by reading.

•

Our efforts to understand the effect that parchment and seal, ink and pen had on worldview eight hundred years ago led us to the discovery of a paradox: literacy is threatened as much by modern education as by modern communication — and yet, adverse as the side effects of compulsory literacy have been for most of our contemporaries, literacy is still the only bulwark against the dissolution of language into "information systems."

•

Words were strung together without any physical definition. Not until the sequence of letters was read aloud was it possible to grasp the words of the text. The author might in theory dictate a sequence of words; but for the scribe they became an unbroken series of letters. From that series of letters the ear had to extract not only the words but also the elevated rhythm of polished speech.

A very timid beginning at dividing up words was made by Jerome. He interrupted his sequence of letters with *cola* and *commata* in order to make legible some of his translations from the Hebrew that would otherwise have been almost meaningless in Latin.

Blackfeet Indian Pencils

"May you write as swiftly as an arrow and as far as the eagle flies."
—Blackfeet Indian Writing Company

Believe their advertising. No hokum spoken. The Blackfeet Indians are crafting the most beautiful and durable pencil available in the United States. No unnatural, glow-in-the-dark colors. No rattling erasers, rubbery pencil casings, or broken leads. I found these high-quality pencils while browsing through the local K-Mart. Although the Blackfeet Indian Pencils currently retail at a price slightly higher than many cheaply made domestic and imported pencils, the Blackfeet Indian Pencil might eliminate those minor inconveniences (such as pencil failure during final exams) that cause a temporary pissed-off attitude towards life.
—Robert D. Rithcie

Blackfeet Indian Pencils
20¢ each, from local stores.
Catalog **free** from The Blackfeet Indian Writing Company, Inc., 733 Yonkers Avenue, Yonkers, NY 10704.

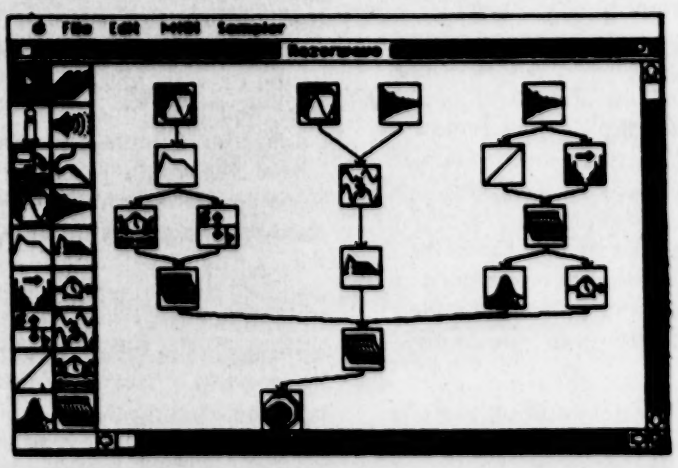
Product	Catalog No.	Description	Unit Pack	Shelf Carton	Shipping Carton	Shipping Carton Weight	Shipping Carton Dimensions H x W x L
Blackfoot Indian Pencil	100	Premium — writing pencil available in 3 degrees: No. 2, 2-2/4, 3	Boxed Dozen	½ gross	10 gross	18 lbs.	8"x 10"x 15"

The Musician's Music Software Catalog

At $5 for a two-year subscription, it's a steal for anyone involved in producing music on MIDI instruments and computers. Its annual issues are supplemented twice a year, and offer almost every available music software for all types of computers at discounted rates. Also included are hardware items such as keyboards and MIDI interface units. The items are described in generous detail, and they offer telephone consultation and on-line customer support over a computer-accessed phone line.

The subscription fee is refundable with your first purchase.
—Ramón Sender Barayón

The Musician's Music Software Catalog
$5 from Digital Arts & Technologies, P. O. Box 11, Milford, CT 06460; 800/332-2251.



• Simple is Better!
Turbosynth has a remarkably easy-to-use graphic interface that lets you design the sound you want from a palette of sound "modules". Use as many modules as you wish, arranging and rearranging the modules to create an infinite variety of synthesis patches. A "Patch Cord" tool allows you to connect the modules simply by clicking the mouse.

Adventures in Learning

One publication I always make a point to check out is this very humble newsletter from Bob Albrecht. Albrecht was one of the founders of the People's Computer Company during the 1960s, at a time when personal computers were more of a dream, and it didn't seem as if any computers were "for the people." He's been promoting a right-livelihood and hands-on approach to computers for 20 years now. Bob's message was always simple: math, computers and complicated processes will only be domineering if you stay ignorant of them. The way to change your attitude is to get hold of the cheapest possible version of X and have fun. Naturally the only ones who listened to him were kids. Some of those kids went on to invent the genre of personal computers.

These days he's still talking to kids about dungeons and dragons, play-by-mail fantasy games, folk-computers, calculator math and serious games. His newsletter is cheap and intelligent. He likes to run "Copy Me" pages, made to be xeroxed for classroom use. If you teach kids, you should have Bob on your side. —Kevin Kelly

•

A Year in 30,000 B.C.

Let's pretend. We have invented a time machine. Our first model can go backward into the past but not forward into the future. Also, for some unknown reason, it can go a long ways into the past but not into the recent past. Oh, well, we have long been interested in prehistoric times.

We are interested in getting some first-hand information about how things were in 30,000 B.C. Well, actually we are interested in getting some second-hand information — we want to send *you* to the year 30,000 B.C., give or take a thousand years or so.

Imagine that you are about 20 years old. You will be gone for one year. You are to explore and report on the state of affairs in prehistoric North America circa 30,000 B.C. It was colder then and the glaciers were much farther south. Summers were nice, not too hot. Winters were very cold.

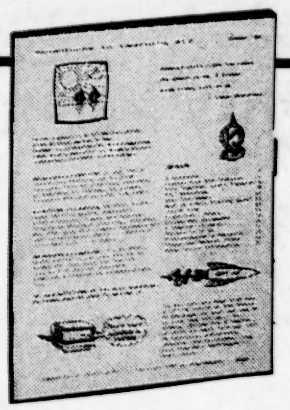
Soon, you will go on your journey in time and space. But first, you are given $2,000 to spend in equipping yourself for one year of survival under rather primitive conditions. (Remember, this is just pretend.)

You may take with you only what you can buy from *one* camping catalog. We like the CAMPMORE and REI catalogs. Carefully shop in the catalog of your choice. *Everything* you take, including clothes, must come from *one* catalog.

What will you buy to take with you? Remember, you must carry everything. We suggest a limit of 50 to 60 pounds. So, as you shop, write the weight of each item and keep track of the total weight of everything you choose.

Teachers: We have used this *situational lesson* in classrooms for a couple of years. Last year, we did it with a combined 3rd-4th grade class one period every two weeks for an entire school year and included math, science, geography, survival skills, orienteering, climatology, comparative shopping, designing a training program for a person would go . . .

In our Problem-Solver's Backpack summer course, we encouraged students to share funwork (previously called homework) with their parents.



Adventures in Learning
Bob Albrecht, Editor

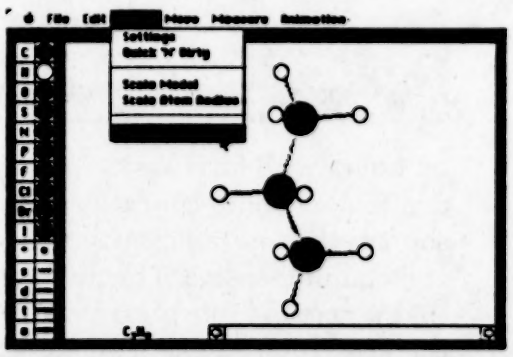
$10/year (5 issues) from Adventures in Learning, 2814 19th Street, San Francisco, CA 94110.

The Academic Courseware Exchange

Kinko's, the copy-center franchise found in most college towns, distributes task-specific software originally written by university professors for their own courses. Primarily for the Macintosh (some are for Apple II), these programs are cheap, costing between $7 and $30. Not versatile enough for the mass market, they are tops for the classroom. Many of them are perfect for jobs too specific for a commercial product.
—Kevin Kelly

Academic Courseware Exchange

Catalog **free** from Kinko's Academic Courseware Exchange, 255 W. Stanley Avenue, Ventura, CA 93001; 800/235-6919.



Molecular Editor allows the user to build and edit structures of more than 100 atoms from any element in the periodic table. Three-dimensional versions of Cut, Copy, and Paste allow the building of molecules from an initial collection of basic structures and functional groups. The program also has the ability to:

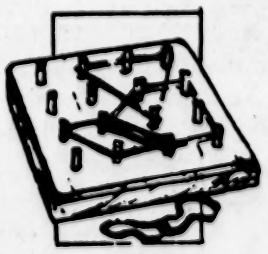
- Draw structures with atoms and bonds, bonds only, or atoms only (continuous variation from touching-hard-sphere model to a bonds-only model)
- Rotate a molecule or a portion of a molecule through any angle about any of three orthogonal axes, either by single steps or continuously
- Invert all coordinates through the origin, or reflect coordinates in various planes
- Measure the distance between any two atoms, the angle between any two bonds attached to the same atom, and the torsional angle about a bond
- Store and retrieve images on disk, and print to an Apple ImageWriter® or LaserWriter® printer
- Open as many as 20 files at once and flip between them manually or run through a sequence of opened files automatically to produce three-dimensional animations.

Montessori Services

The nice thing about this catalog of Montessori school supplies for very young tots is that even if you don't buy anything, you can get your money's worth in ideas of things to try with kids.
—Kevin Kelly

Montessori Services

Catalog **free** from Montessori Services, 228 South A Street, Santa Rosa, CA 95401; 707/579-3003.



RUBBER BAND BOARD - This square board of birch plywood has a lacquer finish. The 16 wooden pegs are evenly spaced about two inches apart. By stretching rubber bands from peg to peg, the child can make many different shapes, from triangles to octagons. Working with the rubber band board is an excellent activity for developing small motor control. This material, also called a geo-board, can be inter-related with activities in the sensorial area (e.g., making certain shapes or patterns).

7 3/4" square — W2 - $15.75

Highly Recommended
Homeschooling Resources

by Mary Pride

Course materials included in Calvert School's home instruction courses.

"NOBODY but a certified teacher can impart knowledge to a child between the ages of five and eighteen." "You need to graduate from public or private high school and go to college to get a good job." "A good job means being hired by a business and progressing up the organization."

Some half-million homeschooling families are challenging some or all of these statements. We can learn on our own, and so can our kids, thank you very much. This does not mean we just pick up school materials and zap Junior with them, though. Homeschoolers' learning vitamins are quite different from the textbooks lining the shelves down at your friendly neighborhood public school.

Schools like to be serious. Down to earth. Teachers' guides and discussion questions, please. And don't forget the workbooks! Schools that break out of this mold often simply substitute a clutter of purposeless (but still compulsory) activities for the usual clutter of seatwork. "Ve vill all paint pink hearts on shoeboxes and stuff zem viss cards for Valentine's Day, and ve vill like it!"

Homeschoolers sometimes do paint pink hearts on shoeboxes, but we do it to have fun, not to fill up hours with busywork. For academics, we prefer educational resources that are innovative, zippy, and comprehensive. The product that covers the most learning in the least time for the least bucks wins. Clutter is out; clever is in.

So, according to the Four Standards for Sane Home Teaching — it's gotta be simple, fun, comprehensive and cheap — here are my personal picks for the top twenty homeschooling resources to date.

CURRICULUM

Some homeschool leaders knock packaged curriculum. As a home schooler who started with packaged curriculum, I still think it's a great way to make the passage from regular schooling to homeschooling. Here are two programs you can use for years with no regrets.

Calvert School has been at this home education business since the last century, and they know what they're doing. You get not only the books but all the supplies — even pencils and paper — you need to finish each grade. Any problem your student is likely to have is anticipated and dealt with in the teacher's manuals. Each grade is more self-instructional than the last; instructions in the upper grades are addressed directly to students. Tests are bound into the manuals and are designed to actually reveal what your student does or does not know. You have your choice of an Advisory Teaching Service, meaning the services of a Calvert teacher who will grade material and provide suggestions and advice to your student, or simply buying the curriculum. The pace is excellent, as is Calvert's emphasis on art and cul-

Mary Pride is not our usual author: multiple degrees in electrical engineering and computer systems engineering, a mother and homeschooler of six children (seventh on the way), and a somewhat noted Evangelical Christian author. (About 90 percent of homeschoolers now are Christian). She wrote three Whole Earth Catalog*-like directories of home schooling resources, the latest of which is* The New Big Book of Home Learning. *Out of the thousands of items she's evaluated, she picked these as her favorites.* —*Kevin Kelly*

ture. You just can't go wrong with Calvert.

Calvert Kindergarten is more of a classic nursery-school program than a modern superbaby learn-to-read program. I recommend it highly to both parents and children as the most fun way around to learn both teaching and learning. First grade is my least favorite Calvert course; I personally would trade their first-grade program for a dedicated phonics course and a first-grade math textbook, and start in again at grade two.

Calvert's curriculum only goes up to grade eight. For high school at home, **University of Nebraska-Lincoln** has many advantages. First, it works. The courses are more like those we and our parents took than today's vague mish-mash. This means you can tell what you are supposed to be learning and whether you are learning it or not. Second, if you can get the written permission of your local school administrator and find an "approved" person to supervise the program, you can get real live public-high-school credits for U.N.-L. courses. Third, the prices are reasonable. Fourth, U.N.-L. provides science supplies for the lab courses — a real boon that will save you hours of scrounging in strange shops. Fifth, all courses are self-instructional. Sixth, the syllabi are excellent academically. Seventh, U.N-L. is ready and eager to work with home schoolers. Eighth, aren't seven reasons like this good enough? Incidentally, your student might qualify for a U.N-L. scholarship. Write for applications to the K. O. Broady Scholarship Committee, Room 269C, at U.N-L.

Calvert School: *Tuscany Rd., Baltimore, MD 21210; (301) 246-6030.* Free brochure with detailed outline of subjects and topics.

University of Nebraska-Lincoln/*Division of Continuing Studies: Lincoln, NE 68583-0900; (402) 472-1926.* Courses run about $50 per semester. Books and supplies are about $30-$40 per course; science supplies run $40-$100 per course. Discounts for Nebraska residents. Free brochure.

TEXTBOOKS

First it was the Beatles. Next it was punk rock. This time around, the British invasion is spearheaded by the **Usborne** book line, an English company whose U.S.A. distributor is **EDC Publications, Inc.** Covering just about all school subject areas, and quite a few you will never see in school, Usborne books are to textbooks what Steven Spielberg productions are to movies. We're talking entertainment value here. Every page heavily illustrated. Text that explains the illustrations. Fascinating bits of trivia splattered throughout. Even the text is visual — the human body, for example, is explained using everything from a machine metaphor to a police metaphor (white blood cell cops chasing down germ villains).

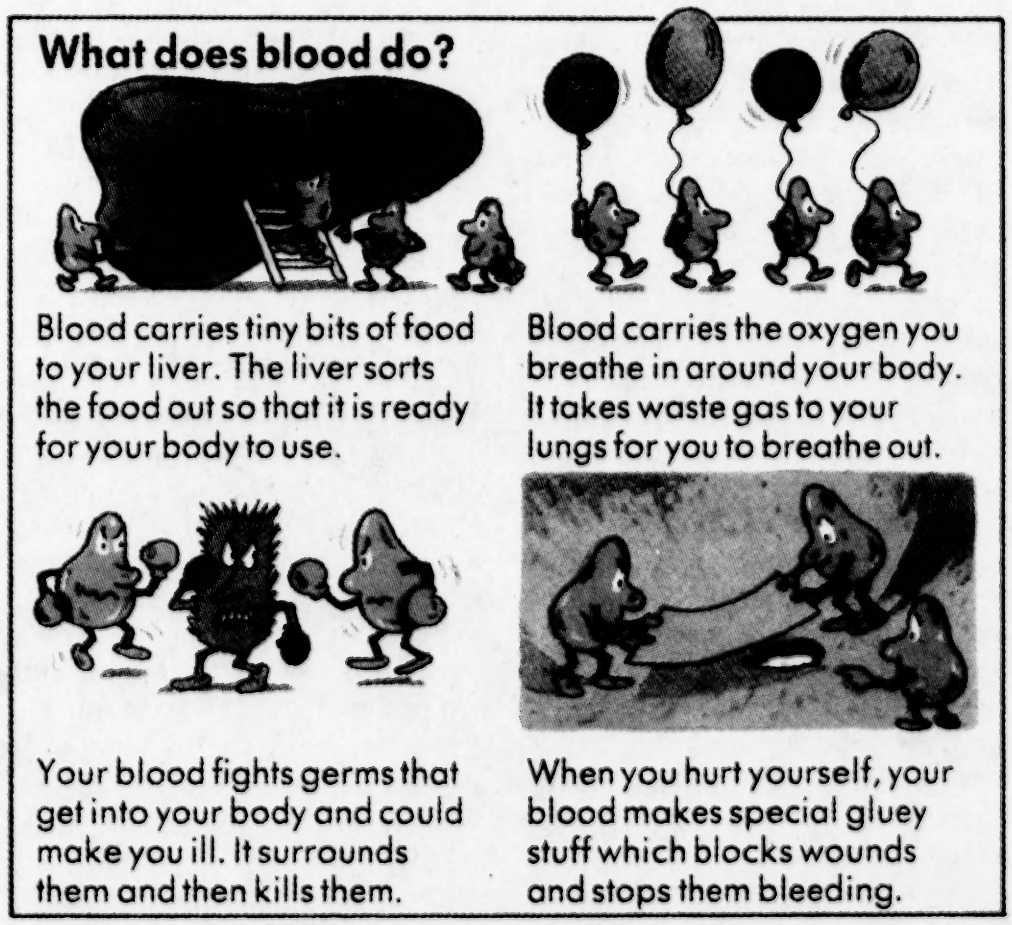
Free of the preachiness that so mars American textbooks, Usborne books share a liveliness and joie de vivre that marks them for greatness. You can use them with or without other curriculum. If you're looking to add some zing to your kids' education, it's a great place to start.

EDC, Inc.: *P.O. Box 470663, Tulsa, OK 74147; 1-800-331-4418. OK: (918) 622-4522.* Visa, MC. Free color catalog. *Know-How* series, $5.95 each book. *Mysteries and Marvels* series, $4.95 each book. *First Nature* series, $3.95 each. *Young Scientist* series, $5.95 each. *Explainers* series, $3.95 each. *How Your Body Works*, etc., $5.95 each book. *Introductions* series, $5.95 each book. *New Technology* series, $5.95 each. Add 15 percent for shipping.

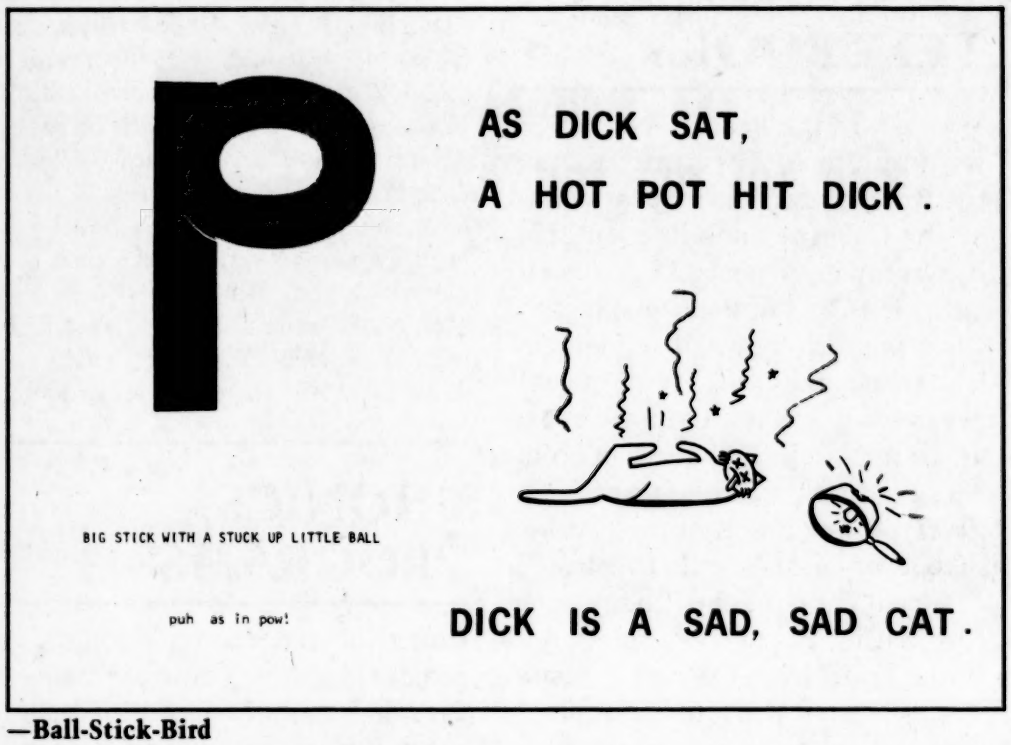
PHONICS PROGRAMS

I mentioned dedicated phonics programs above. These are packages designed to do nothing but teach Junior to read. The state of our national illiteracy being what it is today, many people who otherwise are into traditional schooling are willing to venture into home teaching just for this purpose.

The problem is that every Thomasina, Dick, and Harriet who teaches his or her child to read immediately turns around and invents a phonics program. I flinch every time I see another one of these. There's some gosh-awful stuff out



—From ***The Usborne Children's Encyclopedia***



—Ball-Stick-Bird

there. There's also at least two dozen really good phonics programs out there — so why do people keep reinventing the wheel? I don't have space here for all two dozen, so here are my two current favorites.

Ball-Stick-Bird, invented by research psychologist Dr. Renee Fuller, was designed to teach certified, institutionalized retardates to read (people with an IQ of 60 or less). It actually works, too.

At first blush, Dr. Fuller's chief contribution to phonics teaching might seem her system for breaking down the capital letters into three strokes: the Ball (a circle), the Stick (a line), and the Bird (two lines joined at an angle, like the cartoon of a bird in flight). She color-codes these basic forms to make the difference between the strokes even more dramatic, begins with capital letters presented in a carefully planned sequence, and requires the student to *build* each letter out of its forms (thus involving all four sense modalities). Nice and painless. But what makes Ball-Stick-Bird really different is its psychological approach. Dr. Fuller uses science-fiction stories to tell the tale of how Good Guys can conquer the Bad Guys. Her Good Guys and Bad Guys star in fables about human nature: the lust for power, the folly of sloganeering, how experts use their authority to stifle criticism of their actions, and so on. It is easy to see why "labeled" people — like the "mentally retarded" and "special education" children" — lap up these stories. Dr. Fuller tells it like it is. She literally gives them the words that explain their experience as the powerless victims of "experts."

Ball-Stick-Bird can be used with any person or child mentally old enough to follow a story. Dr. Fuller contends that Story Readiness, not some mystical amount of Motor Skill Readiness, is the real preparation for reading, and that successful reading itself grows out of the basic human desire to understand one's own life as a story. Some heavy philosophy here. Our four-year-old loved it.

"Discover Intensive Phonics for Yourself" from CHAR-L wins the prize for Most Uncluttered Program. The only supplies you need are a blackboard or markerboard and chalk or erasable markers. (The manual tells you how to make your own blackboard, if you prefer.) Comes with big orange manual, "sounds" cassette, two big orange posters that show the 42 sounds, blends, and special vowel combinations your student will be learning, and 324 Reverse Listening cards printed on cheerful colored card stock. These are just for checking the student's understanding; "nonsense words" are included. And the very best part is that most work is done standing up at the blackboard. Active kids LOVE blackboard work — especially the kind of kids who fail with sit-down-and-pay-attention types of phonics programs. Note: If you already know how to teach your kids to write the letters, are acquainted with blends, digraphs, and so on, and your kids have nothing organically wrong with them, you don't need a phonics program. The main thing to remember about teaching your own kids to read is if you don't at first succeed, wait a while and try again. They'll learn sooner or later. Some kids learn at three, others at seven or eight. You can speed up the process best by reading to them a lot, not by flashing cards at them.

Ball-Stick-Bird Publications, Inc.: *Box 592, Stony Brook, NY 11790.* Set 1, Books 1 through 5 with Instructor's Manual, $62.95. Set 2, Books 6-10 with Instructor's Manual, $62.95. No returns. Free brochure.

Char-L Inc.: *570 S. Church, Apt. 2E, Decatur, IL 62522; (217) 422-0077.* Free brochure. Complete phonics program, *Discover Intensive Phonics for Yourself.* $104 plus $6 UPS shipping. Free brochure.

MATH

Math anxiety is second only to phonics phear among homeschoolers. I've tried bunches of cute little manipulatives and widgets designed to overcome math anxiety, and have come to the conclusion that you can teach math this way, but it takes a long time.

So for now let's forget the Cuisinaire rods and Unifix cubes. For math I like the following.

Bob Jones University Press math textbooks. I know what you're thinking. "Bob Jones University?!! Aren't they the fighting fundies who got their tax-exempt status yanked because of racism?" Once again, the picture the mainstream media give us and the picture you get from checking it out for your-

self turn out to be two different animals. There's not a speck of racism in these textbooks. Also, in spite of BJU's image of fervent fundamentalism, the Christianity in this series goes no deeper than an occasional example of Johnny anteing up his Sunday school offering. As a Christian myself, I wouldn't have minded more heavy-hitting evangelism, but BJUP's laid-back approach does make the BJU math line eligible for people who would not otherwise consider it.

As math texts, these are by far the best I have seen. BJU believes in getting students to think about math, not just fill out endless pages of exercises. When I say that our kindergartners and first-graders actually pestered me to "let them" do math each day, you'll see BJU has a good thing going. These texts are actually less preachy than the public-school variety — no boring sermons on why Janice, age six, should relentlessly drive toward the goal of becoming an airline pilot. Lots of math tricks, games, riddles, geometry play, charts, graphs, and real-life math practice, along with just enough traditional math teaching and exercises. I really like this series up to grade six.

Since BJU doesn't dumb down their books, you might be smart to start with your child's last grade level. Also, only if you really are a math ignoramus do you need the expensive Teacher's Manuals. I have never touched them myself.

Saxon Math. For grades 7-12, we rely on the Saxon Math series. John Saxon, an iconoclast if there ever was one, has done the impossible. He designed a series of math texts that had public-school kids *wanting* to enroll in algebra. Once in, lower-tracked kids using Saxon outperformed hotshots using regular math texts by remarkable margins. Until the feminists and establishment math honchos combined to vent their wrath on Saxon for *(a)* not promoting female superiority (in one of Saxon's problem sets, a boy actually beat the girls in a footrace) and *(b)* knocking the obviously bad way math is presently taught in America, it seemed that Saxon Math would sweep the country; now, it's just sweeping the homeschool market.

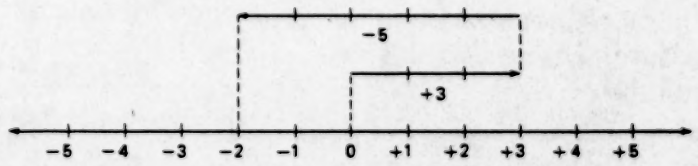
Saxon believes in letting kids use what they have learned, so they will remember it and start enjoying the feeling of succeeding in math. Thus, his problem sets always include problems from units previously taught. He also is an extremely witty and humorous fellow, and the problem sets reflect this. Don't be bound in your thinking about what age your kids have to be to start using Saxon Math. Our son started on Algebra 1/2 when he was eight. The only prerequisite for the Algebra series is a good understanding of and speed at the four basic operations: adding, subtracting, multiplying, and dividing. Fractions and decimals help, but Saxon covers those in the Algebra books for the benefit of the math cripples the school system commonly delivers on the doorsteps of upper-level math teachers.

—From *Saxon Algebra I.*

It may seem that we are trying to turn an easy problem into a difficult problem, but such is not the case. **In algebra the operations of addition and subtraction are lumped together in the one operation of algebraic addition, and this enables a straightforward solution to problems that would be very confusing if the concepts of signed numbers and algebraic addition were not used.**

example 3.2 Use directed numbers and the number line to add +3 and −5.

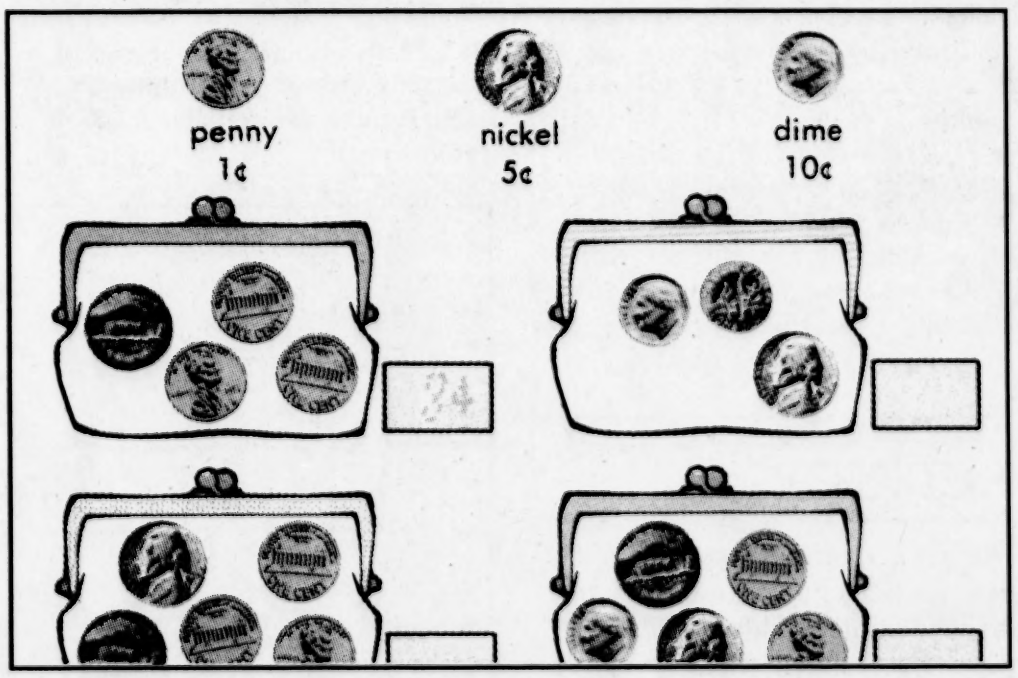
solution



We begin at the origin and draw an arrow 3 units long that points to the right to represent the number +3. From the head of this arrow we draw an arrow 5 units long that points to the left to represent the number −5. The head of the second arrow is just above the number −2 on the number line. Thus we see that

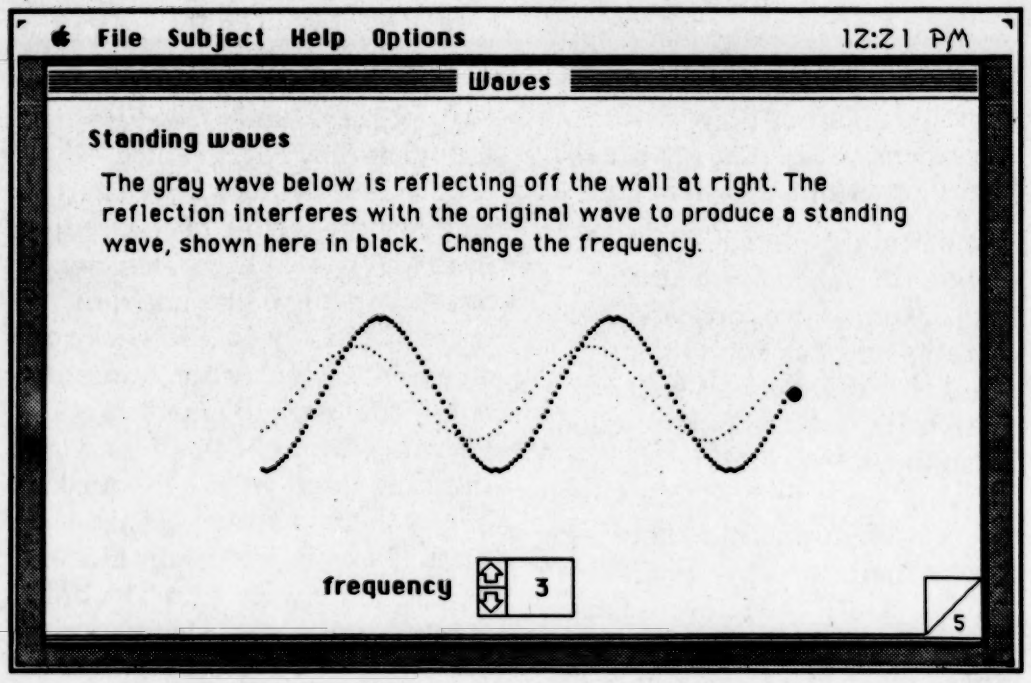
$$(+3)+(-5)=-2$$

—From *BJU Math: Book 2.*



If you want your children to learn how to do all the math calculations quickly, the best way is to run them through a spot of timed drill every day, progressing from the simplest skills to the more advanced. I have seen fliers for a program used by a million Japanese kids that does this for a really fancy price. Or you could get **Providence Project's "CalcuLadder"** series.

CalcuLadder does everything right. You get twelve copies (on colored paper) of each drill sheet. Sixteen sheets makes a year's worth. Your student does a sheet a day until he beats the time limit. Grading is a snap with the QuicKey grading



—Brøderbund Physics. The screen is animated in response to frequency selected.

keys. Just align the QuicKey with the drill sheet and immediately see if the answers are right or not. The Instructor's Handbook, a mercifully slim pamphlet, answers any questions you might have, while Achievement Certificates are included to mark the quantum jump from one drill sheet to the next. We're talking two minutes or so per sheet, so it never gets boring. Read the Bible verse in the margin if you finish early.

This slimmed-down calculations-only style of drill is how my father taught me eight grades of math in the summer I was six. It's fast and fun!

Top Stuff Department: **Brøderbund Software's Geometry Program.** Brøderbund seems to have a hammerlock on programs that take computers to the max. Its Geometry program lets you manipulate angles and other geometric features, do geometry experiments, and solve proofs on-screen. This is far more than typing in the answers to problems — it's interactive math covering a whole year's coursework. Complete with index, online help, and hypertext links between text definitions and graphics of the object defined, it's one more good reason to buy a Macintosh or Apple IIgs.

Brøderbund's **Physics** and **Calculus** programs follow the same format and are equally top-notch. Try the mail-order discount dealers with full-page ads in *MacUser* and *A+* magazines and see if they are being offered at discount before paying list price at your local software store.

Bob Jones University Press/*Customer Services: Greenville, SC 29614; (800) 845-5731 weekdays.* MC, Visa, C.O.D. Free catalog. You may call for info or a catalog on the toll-free number. Very friendly people.

Saxon Publishers, Inc.: *1002 Lincoln Green, Norman, OK 73032.* Check or M.O. Math 65 (average 6th grade, advanced fifth grade), Math 76, Algebra 1/2, Algebra I, Algebra II, $30 each (includes text, tests, and answers). Geom/Trig/ Alg III, $35. Free shipping. Hardbound books.

The Providence Project: *P.O. Box 1760, Wichita, KS 67201; (316) 265-0321.* $15.95 per CalcuLadder unit (specify grade level: grades 1-6 available). It's a good idea to start below your child's grade level to build up confidence and make sure he really knows what he's doing. Trial Pac $2, refundable on first order; includes miniature overview of all Providence Project materials.

Brøderbund Software: *17 Paul Dr., San Rafael, CA 94903-2101; (800) 521-6263, 415) 492-3500.* Geometry: $99.95 for Macintosh, $79.95 for Apple IIgs (Home Edition). Calculus and Physics: $99.95 each (Mac only). Add $3.50 shipping.
Free catalog and newsletter.

SCIENCE

We use Usborne books for our entire science curriculum. All you have to do to teach science this way is to leave the books lying around. That is, if you're not too busy reading them.

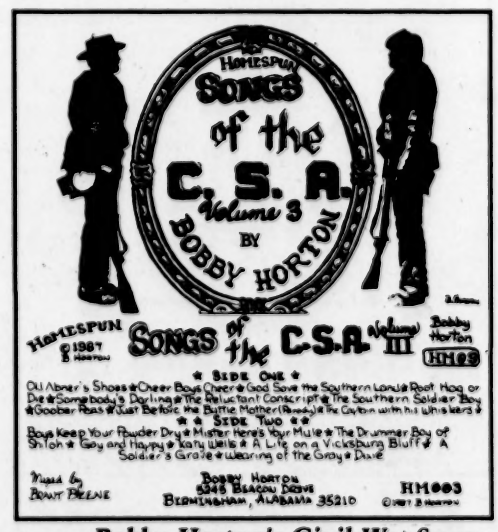
See "Textbooks" (p. 125) for access.

SOCIABLE STUDIES

History resources are mostly bunk. They tend to be propaganda and censor out all the juicy bits. In real life, history is more like a best-selling novel or a great ballad than a list of dates and battles. So if you'd like to generate a little historical excitement, meet **Bobby Horton.** This almost disgustingly talented man has put together five cassettes of Civil War songs — four of Confederate songs and one of Union songs — on which he sings all the parts and plays all of the numerous instruments. These are the real songs, running the gamut from comic to tragic, from piety to cussing, from toe-tapping bravado to majestic patriotism (on both sides). Textbooks just can't take you there the way these songs do. Musically speaking, they are excellent, too, in the tradition of Pete Seeger and other folk artists.

I think the best way to study history is to read a lot of old novels and source documents (Bobby Horton's songs count as source documents). Find out what the people themselves were thinking, instead of what some textbook committee wants to tell you about them!

Bobby Horton: *5245 Beacon Drive, Birmingham, AL 35210.* "Songs of the CSA," four volumes, and "Songs of the Union Army," one volume, $8.95 each. Lyric sheets available for $3 per volume.



—Bobby Horton's Civil War Songs.

CLASSICAL LANGUAGES

I don't know how much *WER* readers are into Latin, but if you are, the course to get is **Waldo Sweet's Artes Latinae** course, published by Bolchazy-Carducci Publishers. This programmed language Latin course is self-instructional; even preteens can use it. The manuals and cassettes tell you exactly what to do and how to test yourself as you go along to see if you need to review the previous steps.

The heart of the course is "Basic Sentences," famous quotations from famous classical writers and the Bible. Each Basic Sentence gives the student a grammatical form — like the basic subject-verb-object sentence *Vestus virum reddit* ("clothes make the man"). The student learns to put vocabulary words into these basic sentences, thus creating an infinite range of new sentences. The course also introduces classical literature and Roman culture.

You can also get filmstrips, cassettes, and even Latin buttons featuring the Basic Sentences. If you prefer Classical Greek buttons (wear 'em and impress your friends), Bolchazy-Carducci Publishers has them, too.

Although the course is completely self-instructional, parents ought to plan on listening to the cassettes along with the book yourself, so you can help your children over the few rough spots that inevitably crop up. Besides, it's fun!

Bolchazy-Carducci Publishers: *44 Lake Street, Oak Park, IL 60302; (312) 386-8360.* MC, Visa, AMEX. Free catalog includes ordering info for many other magazines, publishers. Must request button catalog separately.

FOREIGN LANGUAGES

For children, my favorite is still **The Learnables** from **International Linguistics Corp.** They now offer English, Spanish, French, German, Chinese and Russian. You learn to count to ten on the tape, then look at sequences of pictures (numbered 1-10), hear the sentences illustrated in the pictures, and learn the language. No pain, no strain. Our children love it, especially the sequence where the baby throws his egg *sur le plancher* (on the floor), *á la fenêtre* (at the window) . . . you get the idea.

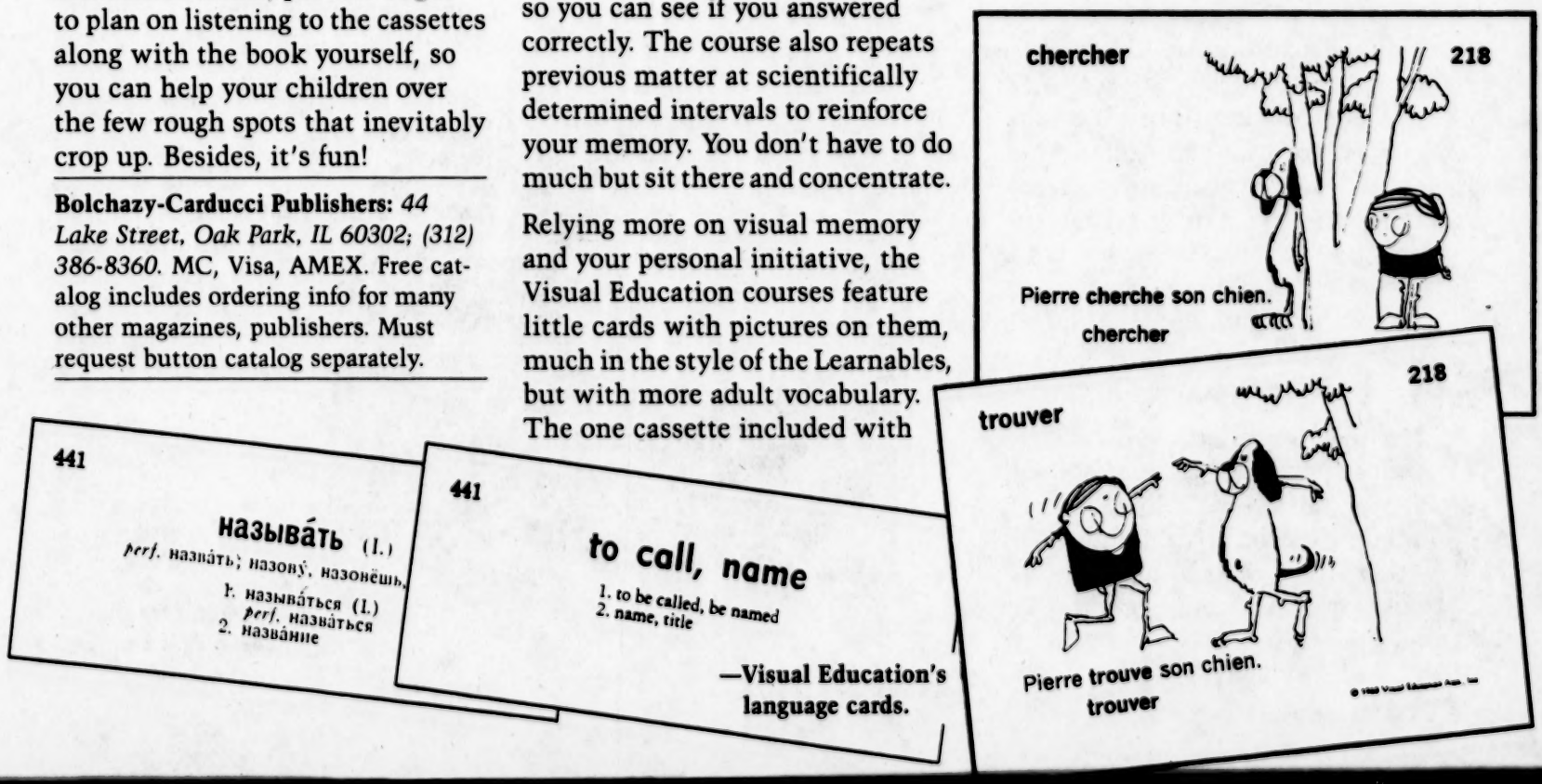
For adults, my picks are **SyberVision's** top-of-the-line **Speak, Read, and Think** foreign-language series (for auditory learners) and **Visual Education's** inexpensive **Think French/German/Spanish** language series (for visual learners).

SyberVision courses feature anticipation, recall, and the use of basic sentences as a model for creating new sentences — just like Artes Latinae, reviewed above. First, you hear a dialog in foreign speech. The cassette instructor breaks down the sentences into words and the words into syllables. You are asked to repeat these words and syllables. Then, using what you have learned, you are asked questions in the target language. The correct response is then given, so you can see if you answered correctly. The course also repeats previous matter at scientifically determined intervals to reinforce your memory. You don't have to do much but sit there and concentrate.

Relying more on visual memory and your personal initiative, the Visual Education courses feature little cards with pictures on them, much in the style of the Learnables, but with more adult vocabulary. The one cassette included with each level covers some, but not all, of the written material on the cards. You'll have to translate the words you can't figure out yourself, with the help of the included study booklet. For more help, you'll find green "Structural Pattern" or "Usage" cards giving grammar principles and drill. Each Visual Education course comes in two levels, each corresponding to a year of high school language instruction or a semester of college.

Ah, yes, the prices. The SyberVision courses cost $245 apiece for Spanish, French, German, and Modern Hebrew, including a guarantee that after completing the course you will be able to pass the built-in test set at the level required of junior American diplomats abroad. The Visual Education courses, on the other hand, cost $14.95 apiece. It's your choice.

Computer-based language teaching courses suffer from the flaws in computer voices. The Mac can't even speak 100-percent phonetic English yet, so who trusts it in Spanish? And I haven't included any video language courses in this list because the ones I have seen are so terrible — boring touristy dialogs, tons of dead time where nothing happens, etc. Video, however, will be the medium of the future for language instruction when publishers begin to figure out how to show and tell instead of lecturing. If you want to put together a foreign language video



—Visual Education's language cards.

with your home camera, start with nouns (*le fromage, la pomme, le garçon*) and follow with verbs (*le garçon mange*), adverbs (*le garçon mange vite*), adjectives (*le petit garçon mange*), and prepositions (*le garçon met le verre sur la table*). I.e., the Learnables on video.

International Linguistics Corporation: *3505 E. Red Bridge Rd., Kansas City, MO 64137. (800) 237-1830. MO: (816) 765-8855.* Set of five cassettes plus book, $35. Four levels available for each language. 10-percent discount and free shipping on prepaid orders. Sample cassette and text, $1.

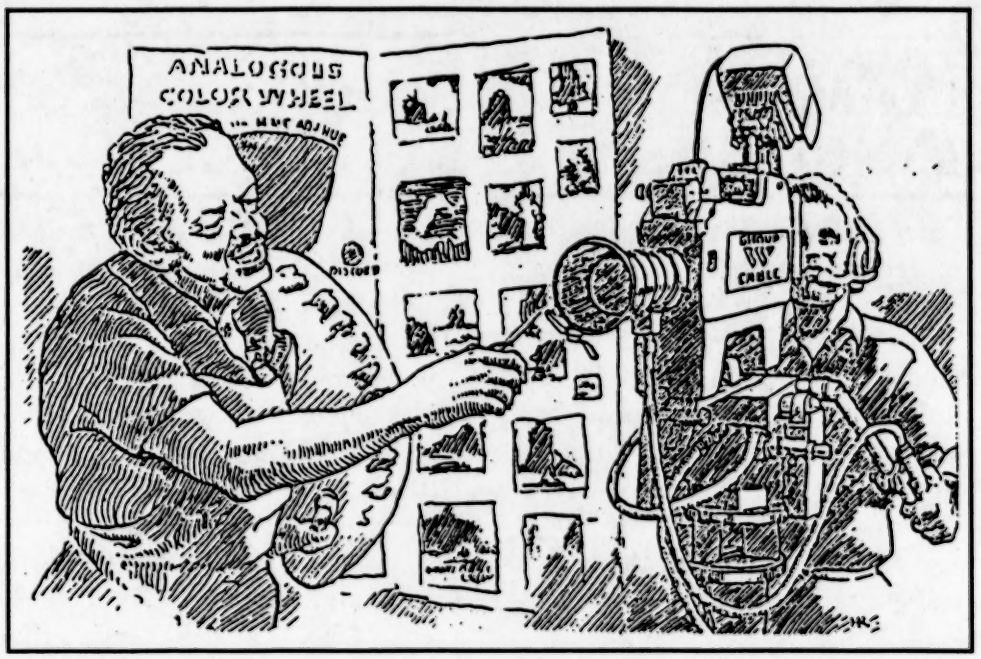
SyberVision: *Fountain Square, 6066 Civic Terrace Avenue, Newark, CA 94560-3747; (800) 227-0600, 24 hours/day. Outside USA, (415) 790-3637.* 60-day unconditional guarantee. Catalog, $2.

Visual Education Association (Vis-Ed): *581 West Leffel Lane/P.O. Box 1666, Springfield, OH 45501.* Vocabulary flashcards, $6.95 each. *Think Language* series, $14.95 each level. Specify records or cassettes. Levels available: Spanish I and II, French I and II, German I and II, English I (for foreign students and remedial). Shipping extra — they bill you. Free catalog.

ART

Only God can make a tree, but any five-year-old can paint a picture of it. Kids can paint as well as adults, if you get them the right tools and supplies and teach them how to do it. We bought a couple of **Dolores Demeres art instruction videos from Art Video Library** at $14.95 each, got the recommended supplies from a local art-supply store, and now I dare you to tell the difference between my husband Bill's paintings and Sarah's (she's five). The reason is that Mrs. Demeres, a remarkably gifted teacher, explains the how and why of art techniques instead of urging her students to *express* themselves.

Demeres series are available (by rent or purchase) for Acrylics, Oils, Pastels, and Watercolor. Art Video Libraries also carries hundreds of other titles, with something for everyone from rank beginners to advanced artists.



—Art Video

I recommend that you start with acrylics, as they are much easier to work with than watercolors and yield quicker results than oils. Acrylics give much more impressive results than watercolors and tempera — the only reason schools don't use them is that they cost more. Just be sure everyone is wearing a smock or very old clothes.

Art Video Library: *1389 Saratoga Way, Grant's Pass, OR 97526; (503) 474-1938.* Descriptive catalog sent with first order. Membership fee of $25 a year allows you to rent videos ($4/video for those priced at $39.95 and under, $10/video for those priced at $40 or more, plus $6 shipping total for up to three videos at once), and is well worth it for homeschoolers who are serious about art. For videos priced at $29.95 and up, you can apply the rental fee towards the purchase price. You do not have to join to purchase videos.

VIDEOS WITHOUT TV

Speaking of videos, we have found that the eternal struggle against television addiction is much easier when you own **a video player that does not tune in TV.** After years of searching, I found a company that sells these standalone video players to businesses. Since, according to company rules, they have to sell through distributors, they quite literally shanghaied me into offering these through my own business, Home Life. The sets have a 14" screen, and the one I recommend for homeschooling use features freeze frame, slow-mo, and visual search on both forward and rewind — all excellent features for use with videos such as Dolores Demeres's.

Video player that doesn't pick up TV.

Home Life: *P.O. Box 1250, Fenton, MO 63026.* VHS-1410 13" Monitor/Video Player $595. Family productivity books and tapes, including Don Aslett's books (and mine, of course). Free catalog.

REAL-LIFE SKILLS

Remember how you used to bag up your crummy laundry and bring it home to Mother? Do you want your kids to bring their laundry home to you? Well then, it's time for what we homeschoolers call "real-life skills," as in, "Hey, they never taught me this in school!"

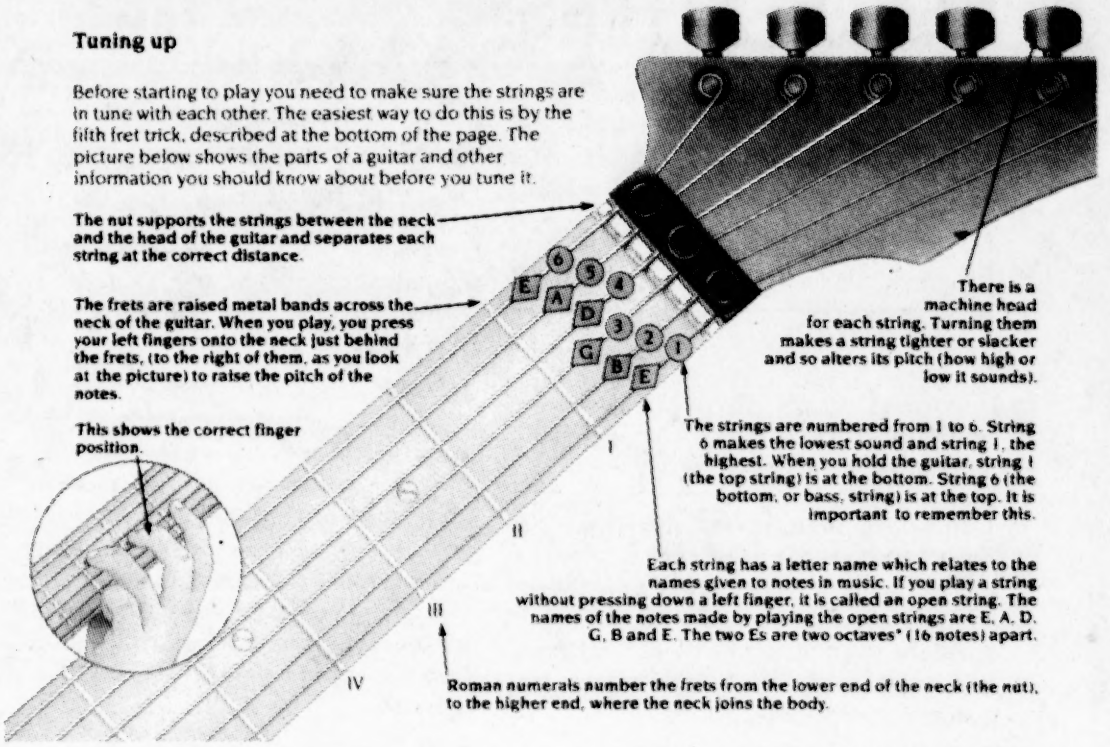
The place to start is **Don Aslett's "Is There Life After Housework?" video.** Don Aslett is the only man in America who can turn a housecleaning seminar into a cross between the Three Stooges and the Tonight show. Meanwhile, he is giving you the scoop on how to do all your housework with 75 percent less effort.

When I tell you that our kids have requested this video at least ten times, you know it's gotta be hot. When I tell you that the two oldest boys now fight for a chance to clean the bathroom, you know it's red-hot!

Don Aslett's Cleaning Center carries the special professional supplies Don recommends. It's the only place where you can buy your wife (or husband) cleaning stuff for your anniversary and get thanked for it. Naturally, you can get all Don's books there as well as the video described above.

Don Aslett's Cleaning Center: *P.O. Box 39/311 S. Fifth, Pocatello, ID 83204; (800) 451-2402. ID: (208) 232-6212.* Visa, MC. Free catalog of professional cleaning supplies and Don Aslett books and videos.

—Is There Life After Housework?



—From EDC's *Learn to Play Guitar.*

CRAFTS

You owe the kids something, now that they've taken over scrubbing the floors and washing the walls, so why not get them a book or two from the **"Know-How" series** from **EDC Publishing**? Unlike so many how-to-do-it books, these are loaded with projects kids actually want to do. The series includes Jokes and Tricks, Detection, Experiments, Fishing, Action Games (like tabletop hockey — games to put together and play), Action Toys (toys and machines to make), Paper Fun, Puppets, Batteries and Magnets, Print and Paint, Spycraft, and Flying Models. Some of these can count as science or art or engineering, so you'll be building better minds three or four ways at once. Good ol' American know-how (from England, of course).

See "Textbooks" (p. 125).

HIRE EDUCATION

My father is a college professor. My husband taught community college for two years. I myself have two college degrees. So what, you say? Exactly.

Remember the course where you could have learned just as much by disappearing into a corner and reading the text? The foreign T.A. with the charming but impenetrable accent? The "small" classes of four hundred students or so? The professor whom one saw, as through a glass darkly, vanishing from the sight of his students upon completion of his arduous five hours a week of "teaching"? For this you should pay $10,000-plus per year, not including room and board?

Here are some alternatives to I-and-my-children-must-go-to-college-to-get-a-good-job thinking. First, try reading **Profscam** by Charles J. Sykes for sundry good documented reasons why Hire Education has become a massive ripoff (available from the American Citizen Catalog). Then get a copy of **Bear's Guide to Non-Traditional College Degrees** (*EWEC* p. 379) from Ten-Speed Press. If you must get a degree, Bear will show you how to get it off-campus for a fraction of the price, and without any groupthink classes, either. Updated yearly. Well worth it!

The American Citizen: *950 North Shore Drive, Lake Bluff, IL 60044; (800) 448-8311 anytime (for credit card orders only). IL: (312) 295-8088.* Visa, MC, AmX. Minimum charge order, $15. *Profscam:* $18.95. Shipping: a straight $4 regardless of order size. Free catalog.

Ten-Speed Press: *P.O. Box 7123, Berkeley, CA 94707; (415) 845-8414. Bear's Guide,* $9.95 plus $1 shipping. ■

BACKSCATTER

Echoes from readers back to *Whole Earth Review* (27 Gate Five Road, Sausalito, California 94965)
We pay $15 for every letter we publish.

Bounties for ecological vigilance

I am writing to suggest that the Point Foundation, and the environmental movement in general, make use of a time tested and very effective tactic to accomplish your goals: the offering of a REWARD for those who come forth with verifiable information concerning ecological atrocities.

Environmental groups spend much of their money doing research. But the really hot information is rarely in the public domain. The most valuable, and damning, information is inside information.

Workers or managers who may know of scandals, illegalities, or dangerous conditions are often (usually) afraid of reporting them for fear of losing their jobs and being blacklisted in their careers. A promise of financial security, should their allegations be proven, might induce many of these people to come forward. It also might increase the general level of vigilance concerning potential problems.

There are two great advantages to a reward system:

1.) It is very flexible. It can be applied to any issue (killing of endangered species, dumping of toxic wastes, drunkenness at nuclear plants, or whatever), and it can be applied to any target (an entire industry, a specific plant or agency, a particular activity, etc.)

2.) The reward is paid only when you win: upon a court conviction, administrative action, media exposure, or whatever condition you set. You pay only for guaranteed success rather than to maintain a research bureaucracy whose efforts may or may not pan out, and whose results are generally of much more marginal value. (I would suggest that a reward system be used to supplement, and perhaps streamline, rather than supplant your own research).

I believe that the use of such financial incentives could be very productive in exposing and stopping ecological atrocities. I hope that you will consider using this tool.

Tom Falvey
San Francisco, CA

Conventional waste engineering dressed up in blue jeans

I was a little perturbed by some of the attitudes expressed by John Todd's article "Adventure of an Applied Ecologist," (*WER* #62, p. 36).

I feel Mr. Todd was misleading by describing ecosystem approach as dramatically different from conventional waste engineering. Virtually every municipal waste treatment plant in this country uses bacteria to degrade human wastes and purify the water carrying it. He also describes sludge disposal as a crisis. In the Midwest, sludge is used for renovating old strip mines and providing seed beds along highways, with inspiring results.

If Mr. Todd wants to get the word out on his designs, he should publish in the appropriate technical publications like *Journal of the Water Pollution Control Federation, Environmental Science and Technology,* or *Water Research.* I know the readers of *WER* are interested, but they can't provide the necessary peer review to determine if Dr. Todd's designs really have value. Also, it's the readers of the technical journals that will design the waste and water treatment plants of the future.

Finally, I don't question that Mr. Todd deserves financial rewards for his work. I just think that this lack is due to his choice of working outside of "the system." As an environmental professional, I *know* that engineering and consulting firms are going crazy looking for people of his education and experience. He could write his own ticket, if he wanted to. Yes, he may have to buy more than one tie, but the cause might be worth a small sacrifice.

Marc Bonem
Oak Park, IL

One more time

I only met Ed Abbey once. It was in the spring of '76 in Boulder, Colorado. After a surprisingly self-congratulatory *and* realistic talk ("The whole point of *The Monkey Wrench Gang* is that I want an audience"), I introduced myself. I told him how much I appreciated his suggestion in one of his books (*Desert Solitaire,* I think) that there was great pleasure to be had in throwing an empty beer can out the window of a moving automobile. After all, he'd written, it wasn't the can that was ugly but the road.

Only a few days before I'd tried it while crossing the Nevada Desert on Highway 50. He was right. I felt a tremendous rush of exhilaration, of liberation, of freedom. It was as if one of the last taboos had been broken. However, when I threw out another empty later in the day, the guilt so overwhelmed me I turned around and drove back three miles to pick it up.

"Well," Abbey chuckled, "I'm always delighted to be part of any liberation, but the truth is it only works once. Couldn't say that in the book though. It wouldn't have worked there."

Once was enough, although I think I'll try it one more time. Kind of a final gesture to Ed Abbey. Give it a shot for yourself. You're in for a surprise.

Steve Sanfield
Nevada City, CA

Andropathy

In response to "When Women Take Over," (*WER* #63, p. 71):

Regarding gynopathy, I'd like to mention the occurrence of its opposite, "andropathy." I am one of the infrequent males found in that 95% female profession, nursing. Here, the threshold for low-level andropathy is not a percentage, but a number. The number of male nurses needed to trigger low-level andropathy in a health care facility is — one (1).

High-level andropathy occurs when the level of males in a given facility or department exceeds one. Yes, two male nurses will cause the most rabid takeover fears in the nursing department — usually leading to drastic action in reducing the number to zero (0) a.s.a.p.

It looks like men are not the only creatures to suffer from genderopathy.

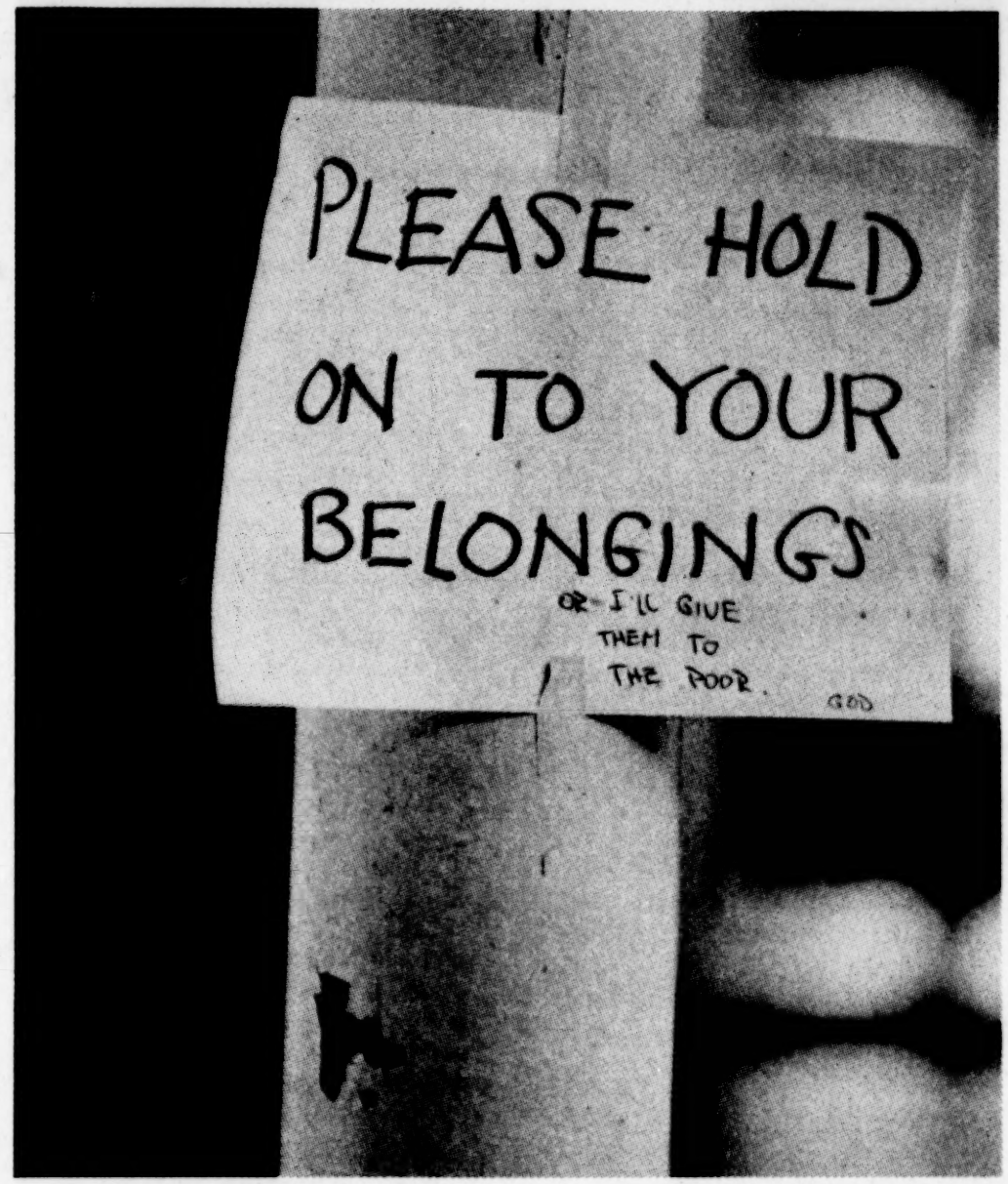
John Foldan, RN
Putnam, CT

In praise of simulated mugging

I am writing in response to George Mockray's letter about the Model Mugging article (*WER* #63, p. 133). Mr. Mockray, who attended a graduation of a Model Mugging class, expressed sadness at the "vicious spectacle," and the wish that there might be a nonviolent way to deal with the problem of sexual assault.

I share Mr. Mockray's admiration for nonviolent problem-solving, and found that the Model Mugging training developed forceful, effective, and nonviolent strategies such as saying 'no" and setting clear boundaries when faced with a potential attacker. Many women feel embarrassed to verbally warn off a threatening person. They may also be afraid to acknowledge a potential attacker because they don't know what to do if the person does in fact attack.

The physical self-defense strategies which Model Mugging teaches give one the confidence to recognize and deal with a threatening situation in the earliest stages, because if you are forced to defend yourself, you can. Until, through the training, I lost some



Chicago City Missionary Society

of my fear of attack, I had no idea how thoroughly my fears and feelings of weakness were crippling me. The confidence I gained through Model Mugging has affected every area of my life positively.

I would much rather experience the "vicious spectacle" in a class where I learn how to deal with it emotionally and physically, than take the chance of experiencing it for real on the street or in my home, as does at least one woman every minute in this country.

Taking the Model Mugging training is the best thing I ever did for myself. I tend to think that if Mr. Mockray were able to gain more than a surface impression of the training, he would find many, many women who feel this way.

Meredith Tromble
San Francisco, CA

Renouncing the first heresy

With respect to your summer 1989 issue, and the question "Is the Body Obsolete?" I'm with Stephanie Mills (who becomes more of a hero of mine with each issue of *WER*): the question pisses me off. Without bodies, life is not life. When we let ourselves think that the forces which comprise our being — ecosystem, body, tradition — have no significance beyond serving as a substrate for our egos, we begin to worship death. It is a necrophilic question. It implies that death and life are morally equal.

I am a Christian, so another thing that bothered me about this issue (and others) is the rather offhanded Christianity-bashing liberally sprinkled throughout. It's not that I think the church is above criticism. In spite of my commitment to the body of Christ, in my more pessimistic moments, I get to feeling that our specialty is less to prefigure the reign of Christ than to blaspheme against the Holy Spirit (the one sin Jesus said would never be forgiven); but what I object to in *WER* is that what passes for historical analysis and critique is mostly only caricature, conceit and prejudice.

Susan Griffin accuses Christianity of considering bodily knowledge as evil, entirely disregarding nearly twenty centuries of sacramental theology, not to mention that Christianity is based on the revelation of God in a fleshly body. Then in another place, Morris Berman gets Christian history exactly backward when he refers to the Gnostic movement as an upsurge of "somatic energy" which was suppressed by the spiritualizing tendencies of Christian orthodoxy. In fact, the Gnostic heresy was characterized primarily by outright hatred and disgust with the body and the material world, and orthodoxy preserved the holiness of creation and human embodiment, insisting, against the Gnostic view, that indeed God did walk on earth, with a human body. Berman also accuses Christianity of failing to deal with the tension of what he calls the "nemo," an "abyss in the soul between self and other." To claim that the Judeo-Christian tradition doesn't deal with this issue is the height of absurdity. In fact, this "nemo" is at the heart of Christian experience, but the name it's had for three thousand years is "sin."

But Christian faith turns in a different direction from the experience of sin than Berman does. Christian faith says that because God in Christ closes the gap for us, we can live in hope and trust. Berman seems to regard this as a loss of nerve on Christians' part. He prefers heroically to embrace the chaos and despair of the "nemo," and live in the tension and anxiety. This is a heresy, and he knows it; the fact that it is a heresy is a recommendation as far as he is concerned.

I suppose it does take a certain kind of superficial spunkiness openly to advocate heresy, but nevertheless, heresies are declared for a reason. Ideas and perspectives are declared heresies when they are death-dealing. (The most recent declaration of heresy that I know of was in the last decade or so: the World Council of Reformed Churches declared apartheid a heresy. Would Berman like to step up and defend it for the sake of his spunkiness?)

Berman is correct, though, in saying that he is advocating heresy. It is a heresy to romanticize chaos. Human beings cannot tolerate chaos; when chaos happens, we die. It is a heresy to advocate the abyss. The abyss is death-dealing. Christian tradition rejects the abyss, and offers the assurance that God has made it possible for us to live in spite of its reality. (I don't think that this constitutes a loss of nerve. Like Peter walking to Jesus on the lake, it takes nerve to trust God to keep us above it.)

Likewise, the notion of the obsolescence of the body is a heresy, a very old heresy, in fact it was the very first heresy that the Christian church ever encountered and subsequently anathematized. It was called Gnosticism, and its followers were people who couldn't wait to die and get away from their evil, weak, mortal coils (much as Marvin Minsky). In opposition to this,

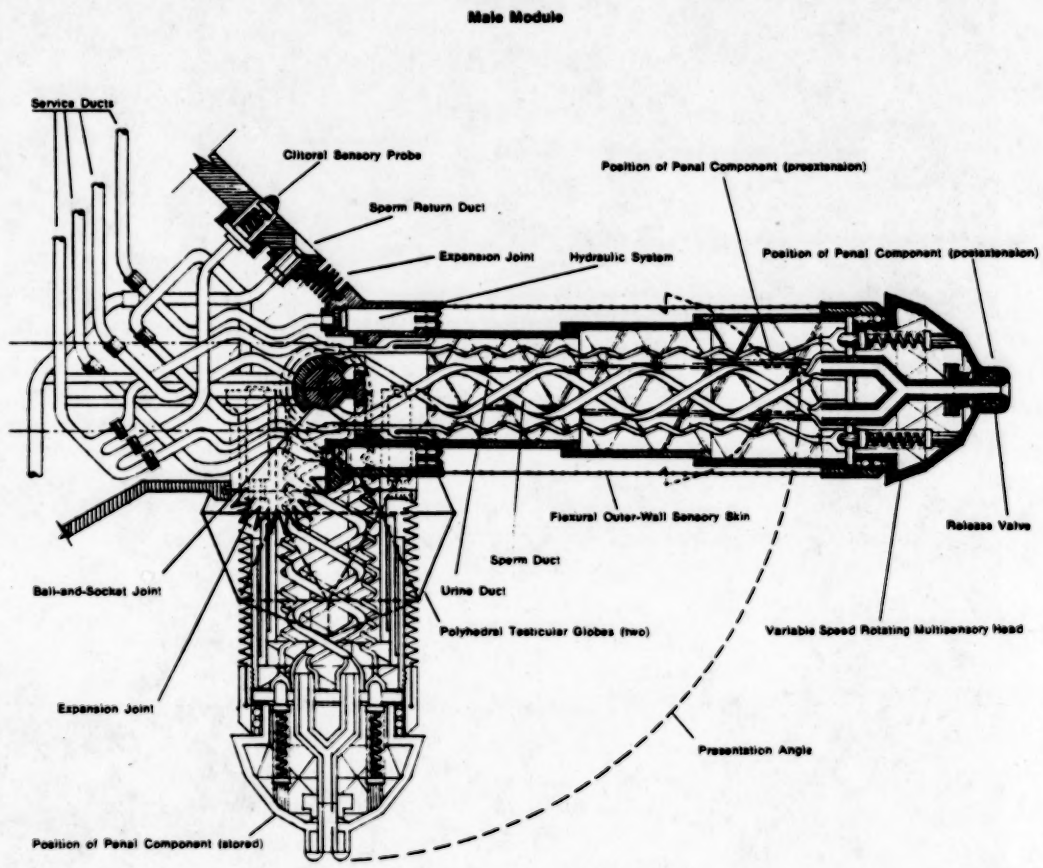
Redesigned sexual equipment

I wondered why you did not include "The Buckminster Fuller Design" in the "Is the Body Obsolete?" issue. It seems quite appropriate. I had seen this over 15-20 years ago and completely forgot about it. Anyway, here it is.

Leon F. Zirkle
Critz, VA

Buckminster Fuller's purpose in designing human sexual equipment was, according to the accompanying copy, a profound dissatisfaction with the design concept of the human form: "The human body, in addition to its operating deficiencies, has a myriad of design flaws, among them the fact that basically the same blueprint has been in use for half a billion years, not because it represents the best possible blueprint but because in the evolutionary drawer it happened to be on top . . . "

Illustrations from Going Too Far, *by Tony Hendra, A Dolphin Book, Doubleday, New York, 1987.*



orthodoxy affirmed the incarnation of God in Christ, and the resurrection *of the body.* Christianity's founding understanding of human life was as embodied life. If you want to find the origins of mind-body dualism, look to Plato, not Moses or the apostle Paul.

Now back to the original point: the idea of the obsolescence of the body is offensive, it's a heresy, it's death-dealing. And it's fundamentally related to the second issue, tradition-bashing. Tradition-bashing is based on the notion that what we need to save us are a set of completely new ideas, some new thinking that will cut us free of the burden of past superstitions and prejudices. If only we become innovative enough, goes the thinking, then we can float free of all the old failures into a brave new world of pure enlightenment. It is only a small imaginative step from there to the idea that one could simply pinch the ego off from the mortal bodily substrate and let it drift free through infinity. This denies the fundamental truth that we cannot live without belonging.

We belong to the earth, we belong to our tradition and our history, and — dare I say it? — we belong to God. There is no experience of holiness without this kind of awareness. There is no existence, no life, without these realities.

Well, I congratulate you on a very provocative summer issue of *WER*. You have held a forum on a radical heresy. I challenge you to do an issue on radical orthodoxy. You might title the theme *Belonging* or *Rehabilitating Tradition.* I predict it will be at least as radical and provocative as the question, "Is the Body Obsolete?"

Britt Johnston
Seminole, OK

Where intellectual work would be physical exercise

Is the body obsolete? It's not an either/or question. Our cultural assumptions about the body: that it is not sacred, just a tool, or that its sacredness makes it sinful to want to transcend its limitations; those are what are obsolete.

I like the idea of using sophisticated technology to get closer to the body. It has always seemed like a shame to me that writers such as myself can't get any exercise while we're writing. It seems to me that by using a virtual reality system one could build a word processor where intellectual work would be physical exercise. Letters would have mass in virtual reality, and picking them up and moving them around would be physical labor, so that writing would be sort of a combination of setting type, weightlifting, and building a house.

Paul Angel
Denver, CO

The human race

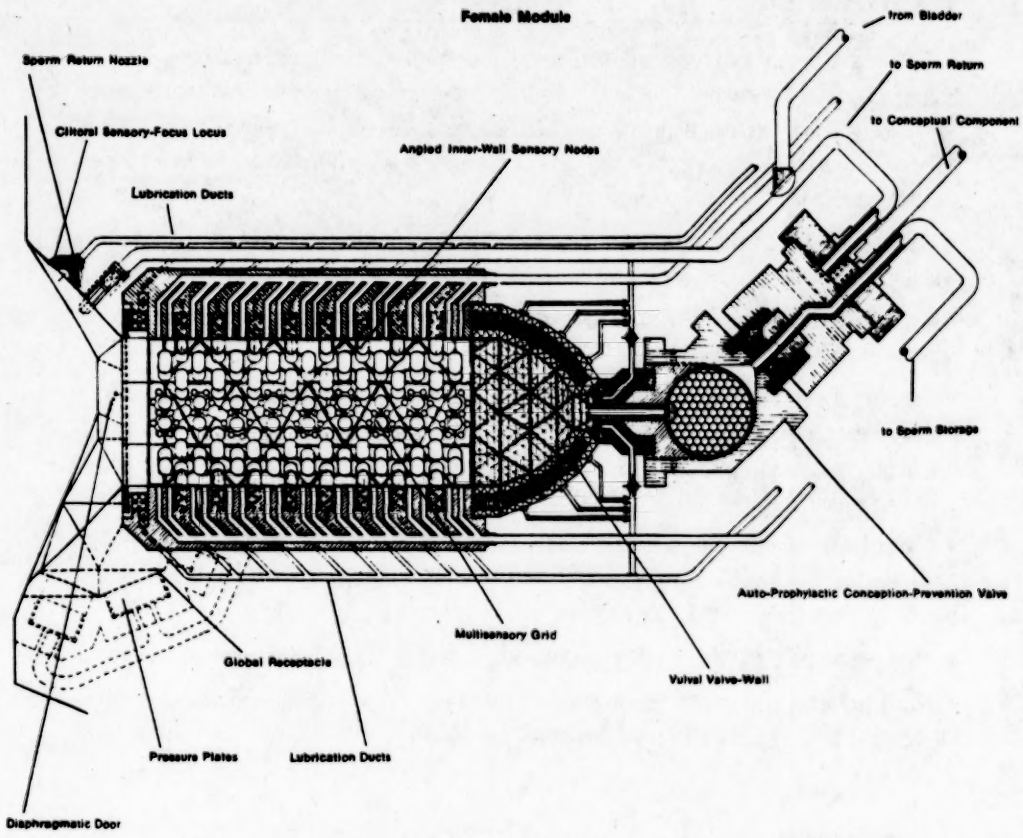
It's not that we're obsolete: it's that we're maladapted. We're a sprint species.

Dennis Writer
Sturgis, SD

A highly evolved sensory input

At first glance I wondered why *WER* would devote a section to a discussion of the question: Is the Body Obsolete? The answer seemed apparent to me: no, of course not, the body is not and will never become obsolete. A mechanical (or synthetic) body might serve us better than an organic one in terms of longevity but its function would be the same. If the body truly is obsolete, its functions also would be obsolete. In fact, the emphasis we place on replacement of non-functioning biological organs/limbs by synthetic (or other biological) ones reflects the great value that we place on the human body and its functions. Even those who take the position that the human body exists solely as a biological vessel for the brain/mind must acknowledge that all of our thoughts and experiences are ultimately derived from sensory input. Since the body provides this input, the body is not obsolete.

A more immediate concern for us is the perceived relationship of mind to body. Most modern cultures and religions delineate sharply between the mind (intellectual or spiritual) and the body (physical), the mind long having been viewed as the superior of the two. As Morris Berman ("The Gesture of Balance," *WER* #63, p. 24) points out, in focusing our attention on the intellectual we become caught up in a search for truth and new and better models to base our lives on. As a result, we live in the future,



always searching for something but not finding it. It is possible to live in harmony with our bodies in such a way that daily life yields satisfaction and a sense of accomplishment through our direct interaction with others and our environment. Indeed, many of our problems: environmental, social, and economic could be resolved simply by recognizing and acting upon this disharmony within ourselves.

Susan R. Pullen
College Station, TX

The body shop future

Concerning obsolete bodies . . . if I were to get my body fixed up with aluminum siding . . . and my insides replaced by machinery . . . how would I be able to afford repairs? Do you know what it costs to get a car fixed these days? And speaking of cars, will the people who made exploding autos also make our bodies . . . and if so, will we too burst into flames every time our rear ends get bumped?

Richard Freeman
Yellow Springs, OH

To dust thou shall return

My idea is to use clay containers instead of styrofoam. Obviously clay is biodegradable and a resource to be had somewhat readily. In India they sell tea in throwaway clay cups. Why can't we have clay meal trays and coffee cups? Sound too simple?

Siena Owen
Garberville, CA

Aw, shucks. You're welcome

Back when younger (not so long ago) first new to *CQ*, I loved it — new doors, new windows, alternatives, etc. Then — oh no — *CQ* became the *Whole Earth Review!!* Computer illiterate, I was confused, bewildered, disillusioned. I let my subscription lapse, not in anger but in perplexion.

Today I went to the library to look at *Whole Earth Review*, to see where you were, and if, with my new-found computer literacy (minus word-processor addiction, thank you) we were in the same place.

"Welcome Home" the pages said. I grinned stupidly at the familiar, comforting pages, the articles I had wanted written, the pictures I had wanted drawn, the R. Crumb I had wanted to avoid but didn't mind looking at, the computer viruses I hadn't gotten around to imagining. Gee, thanks. (Too shy to do more than that, and maybe shake a couple of hands.)

Sign me up for 2 good years!

Karin Lee
Philadelphia, PA

The kind of information your nephew's mother wouldn't like

After reading Mark Ellis's very own "Still Listening" Backscatter (*WER* #63, p. 134), especially his "have to explain to his nephew, that his mother wouldn't like" longings, I have two suggestions.

Neither title appears in the *EWEC* index. In the case of the first that came to mind, I'm surprised as hell. As for the latter, that book travels in totally different circles, but looks like the former's mirror image. It's unlikely you'd have printed a review of it.

The Anarchist's Cookbook, by William Powell ($12; Lyle Stuart, Inc., 120 Enterprise Ave., Secaucus, NJ 07094) seems to have been written for the exclusive purpose of pissing off nephews' mothers. To my knowledge (please remember it's limited by my tender age) it is the precursor to R. U. Sirius's *WER* article on mind-expanding drugs, plus a quick survey of explosives, firearms, and spiking other things than timber.

Survival Guns, by Mel Tappan (out of print, Janus Press; my buddy Kathy at B. Dalton's scrounged one copy for me at triple its publisher's original price) concentrates on the firearms that "awdnary folk" would need, or at least feel they'd need, if circulation of *The Anarchist's Cookbook* suddenly accelerated.

Both books (or at least their assault firearms sections) are ten years overdue for review. Most people find that subject obscene; I'm not sure I do, but face it, assault weapons are tools, albeit for an obscene purpose. Does that make them intrinsically obscene? I don't know. I'll let other Backscatter contributors argue that one.

Would you be interested in reviews of either title?

Sanchez
Bellefonte, PA

Survival Guns *was reviewed heartily in* The Next Whole Earth Catalog *(1980), p. 451. The staff swore we had reviewed* The Anarchist's Cookbook *because it's been lying around the offices for years, but a search of indexes proved negative. Thanks for the reminder.*

See also The Outlaw's Bible, *reviewed on p. 85 of this issue.* —*KK*

Corrections

*The Self-Help Sourcebook (*WER *#63, p. 73) is available in an updated 1988 edition from Self-Help Clearinghouse, Saint Clares-Riverside Medical Center, Pocono Road, Denville, NJ 07834; 201/625-9565.*

"The Artificial Intelligence Debate," originally a special issue of Daedalus *magazine (*WER *#63, p. 16), is now available in book form from MIT Press, 55 Hayward Street, Cambridge, MA 02142; 617/253-2884. The editor is Stephen Grauband.*

Active Offices Systems, whose exercise treadmill appears on p. 97 of WER *#63, can be contacted through Environments for Health, 426 Hickory Street, Missoula, MT 59801; 406/721-5997.*

Fighting Woman News *has reminded us that credit is due for Chuck Canady, whose photograph of Lucille Thompson appeared in* WER *#62, p. 135.* ■

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FINANCIAL REPORT
2ND QUARTER 1989

INCOME	
Subscriptions/back issues	$ 91,209
Mailing list rental	2,961
Direct distribution	20,134
Newsstand sales	19,912
Book sales	(675)
Newspaper column	1,820
Contributions	9,135
Other	2,899
Total Income:	**$ 147,395**
EXPENSES	
Salaries	61,915
Payroll taxes	8,068
Magazine printing	28,305
Circulation promotion	7,237
Subscription fulfillment	8,817
Rent/maintenance/utilities	10,588
Writers/contributors	9,860
Telephone/postage	4,586
Direct distribution	1,225
Newsstand sales	2,664
Vacation/health insurance	1,517
Other	15,390
Total Expenses:	**$ 160,172**
MAGAZINE PROFIT/LOSS	**$-12,777**

POINT FOUNDATION

INCOME	
Global Business Network project	$ 7,754
Whole Earth Review	147,395
Whole Earth Institute	3,510
Total Point Income:	**$ 158,659**
EXPENSES	
Global Business Network project	$ 13
Whole Earth Review	160,172
Whole Earth Institute	2,093
Total Point Expenses:	**$ 162,278**
POINT PROFIT/LOSS	**$ -3,619**

THE WELL

REVENUE	**$ 111,543**
EXPENSES	
Payroll	$ 42,519
Computer/communications	23,523
Office	6,614
General/administrative	11,519
Sales	4,473
Total Expenses:	**$ 88,648**
WELL PROFIT/LOSS	**$ 22,895**

Mailing List Brokers: **Pacific Lists,** Mill Valley, CA; **Triplex Direct Marketing Corporation,** San Rafael, CA.

Photo Processing and Reprographics: **Caledonia Camera,** Sausalito, CA; **Marinstat,** Mill Valley, CA.

Printing: **Combined Communication Services,** Columbia, MO.

WHOLE EARTH INSTITUTE

"You can help with ideas, funding, and contacts."

. . . Is the answer to the question we are often asked: "What is your next project, and how can I participate?"

Whole Earth Institute (WEI) is a research-and-development arm of POINT Foundation. Unlike POINT, which has not depended on philanthropic funding for its operations, Whole Earth Institute will rely on outside contributions. In addition to project funding, WEI is seeking enough money to build a substantial endowment fund, which would allow the projects it sponsors to be financed from the interest generated by the capital in the fund.

As regular readers of this magazine know from our financial statements in each issue, POINT is a break-even operation, a non-profit in the strictest sense of the word. Much of this barely-break-even aspect comes from publishing a periodical which causes magazine pros to shake their heads in disbelief: it has survived for fifteen years without accepting advertising, and without promoting itself by direct mail to maintain its circulation. The advantage of conducting a magazine this way is that by relying solely on our readers for our support, rather than advertisers, we can survive only if readers find us useful. So it's either be useful or die.

We've managed to be useful, but we now feel we need to be something more. The disadvantage of our break-even method is that we haven't an ounce of financial fat to invest in other neat ideas that should be pursued. And after years of trying all kinds of guerrilla-marketing ploys, we have finally admitted that while an advertising-free *Whole Earth Review* (and the books it spins off) can continue for another fifteen years, it will never supply the extra resources needed to bring life to all the ideas that flow through these offices, projects that we are often otherwise ideally suited to nurture.

POINT Foundation has one of the most creative boards of directors around. Likewise, the roster of gifted people who have contributed to the magazine numbers in the hundreds. Because we promote the good tools of others, we also have the cooperation and enthusiasm of the commercial world. And many people who have started successful businesses make it a point to let us know what an inspiration the *Whole Earth Catalogs* were to them. They'd like to keep the education going, and so would we. We created Whole Earth Institute to focus the high-voltage power of these supporters into the next decade.

Hardly a day goes by that we don't receive notice of a new organization committed to "global understanding" or "global peace" or changing the world as a whole. They represent a bustling cottage industry now — the list is probably miles long. Some of them are pretty good. How is Whole Earth Institute going to be different?

For starters, we are not out to save the world. We've found that the saving-the-world-mode is useful for all of about five minutes. After that, the make-one-thing-work mode is more productive. Our interest is independent of trends, which means we tend to go our own way and often wind up early where others come later. Not following the crowd is great for coming up with those solutions tucked into unvisited corners.

Because of our thrifty low-rent/high-impact operation, we'd do the kinds of things with money that you'd want a restless, pioneering non-profit to do: host new gatherings like the one we did for hackers, or promote habitat restoration tools, or try some populist video teleconferences, or experiment with buildings that learn, or plant more WELLs around the country, or make a truly Whole Earth Music Catalog you can play, or do a weekly national radio show.

The honest truth is that we don't know what will happen if these suggestions were to be undertaken.

WHOLE EARTH INSTITUTE

27 GATE FIVE ROAD
SAUSALITO, CA 94965
PHONE (415)332-1716
FAX (415) 332-2416

Dear_____,

Enclosed is a packet of information on Whole Earth Institute, an outgrowth of Point Foundation. I've been involved with Point for ten years, and still marvel at the impact Whole Earth Publications have had and the tenacity with which a small group of people has been able to foment great intellectual change with the most modest of resources.

After years of hand-to-mouth existence, we have engaged a development director to endow and strengthen Point through the creation of Whole Earth Institute. The institute will take a longer-term approach to specific environmental and social issues, and hopefully break Whole Earth's dependence on magazines and books as a somewhat tenuous source of funding.

To do this, it has to be recognized as an institution that is worthy to stand on its own, and that recognition, of course, involves people like you and me supporting it. That is why I write—to invite you to be a Founding Member of Whole Earth Institute. I also write because I sense that W.E.I. will respond to issues that are close to your mind and heart, and that, while being forever iconoclastic, it will represent a generation's sense of how it understands and changes the world it inhabits.

I'm inviting you to not only become a founding contributor, but to join with other outstanding people who have made huge differences in our lives.

With best regards,

Paul Hawken

Draft of a letter Paul Hawken, a POINT board member, will be mailing to individuals who have an appreciation for Whole Earth and who may want to contribute to W.E.I.

The kind of experimentation Whole Earth Institute will be hatching is just that: experimentation — results unforeseen.

Since we are asking for investments with no guarantee of results, you'd be wise to consider our track record: Do we finish what we start? Are we realistic? Are we responsible with money? Do we make a big bang per buck? Have we made all the right mistakes already?

To churn up the waters of the 1990s we are launching Whole Earth Institute. We need your inspired ideas for achievable, high-gain projects. We need people with money who are looking for dependable and creative people to entrust it to. We need you to help us find them. We need your financial support. We would like you to join us in carrying the work of Whole Earth into its third decade.

Fundraiser Susan Frank has put together a package describing the history of Whole Earth in brief, the present board and staff, and some suggested future projects. If you can consider contributing to Whole Earth Institute, but don't know much about us, please call her for the package (you can also use the card bound in the back of the magazine). —Kevin Kelly

GOSSIP

ABOUT ONCE A MONTH we have a staff meeting. We bring extra chairs into the kitchen and meet around the formica table that serves as lunch counter and newspaper-reading hangout. Fifteen to twenty of us completely occupy the tiny room.

The true gossip of this magazine takes place there. We take up the process of the organization, how the parts work (or don't work) to put the magazine together and into readers' hands. We delicately tinker with our finances, consider new promotion schemes, and submerge ourselves into how best to use our limited resources, while maintaining the spirit of the publication. "Stay hungry and foolish," it said on the ***Whole Earth Catalog*** *cover. We are probably too much of both.*

Some notes from our last meeting follow.

Newsstand sales. *Dick Fugett reported on our vigilant battle with big distributors to get into more bookstores and regular magazine racks (vs. the alternative ones, which we have down pretty good). He says we have a deal with Warner to be shown full-cover in Walden bookstores across the country. That means the magazine should be findable on the rack. Next time you're in a Waldenbooks, look for the latest* ***WER****. Ask if you don't see it. Let Dick know what happens.*

Macsub. *Paul Davis gave an update on how our in-house subscription service is doing. Most of the bugs are eradicated. Paul's time has been spent in figuring out how to extract and improve circulation data from our records. Previously we had to do dumb things like mail multiple renewal notices if you had more than one gift sub. Now we can save postage and paper and send you only one piece of mail with all the names of those to whom you gave gift subs last year. And if you are a supporting subscriber, paying extra for extra service, our renewal mailings are newly cognizant of that important fact.*

Salaries. *Except myself, staff are paid a uniform wage per hour. Few of them work full-full time, i.e. a steady 40-hour week. They come and go as work demands, as the magazine's flow waxes and wanes, and as they determine how perfectly to do the job. This makes every payroll different, and budgeting difficult. We discussed the pros and cons of going onto salaries. The pros: more predictable paychecks more often, less time in bookkeeping. The cons: less flexibility in accepting new roles or projects, more uncertainty about being underpaid for long deadline hours. More negotiation (conflict?) in determining the salary. Verdict: undecided yet.*

Finances. *Bookkeeper Richard Ditzler drew a graph showing our current debts and current receivables. The chart showed we are in the hole by* ***$30,000*** *this month. There was no mention of scrimping or cutting back — it's an already-ingrained habit. There is a fair prospect that the summer drive cooked up by Keith Jordan and Richard Schauffler will help us over the doldrums. Here's what they came up with: for signing up at our usual good-deal three-year sub rates (****$54****, already discounted from* ***$60****) you will also receive a free* ***Whole Earth Catalog*** *of your choice. See bound-in card in the back of this magazine to get in on this bargain.*

The Whole Earth Access Company. *I reported at the meeting that I've been getting worrisome complaint letters from readers about the service of the Whole Earth Access Company in fulfilling book orders by mail. We list "or Whole Earth Access" under many of our review items as a service to our readers who would prefer to deal with one mail-order source rather than a number of very-small-time outfits. In general it has worked out well for both sides. For readers, WEAccess stocked many slow-selling books that few bookstores would ever burden their shelves with; for WEAccess, they got mail-order customers far beyond the locale where their retail stores are located. Lately WEAccess has become a California success story, launching four or five new bustling, gigantic retail stores in the San Francisco Bay Area. Their low-profit mail-order sideline may have been neglected in the swell, so we are hoping to work with WEAccess to keep this reader service in good order.*

One by-the-way to readers. It is a common misconception in the Bay Area where these proliferating Whole Earth Access stores advertise ceaselessly on radio and in newspapers, filling their narrow-aisled warehouses to the brim with eager shoppers, that Stewart Brand is the millionaire lounging behind it all. It is an understandable mistake. The unfortunate truth is that even when the ***Whole Earth Catalogs*** *did hit it rich (the* ***Last WEC*** *and the* ***Software Catalog****), all that loot went to Point Foundation. Stewart got an extremely modest salary then (he has not been on Point's payroll for several years now). More unfortunately, neither Stewart nor Point shares in the financial success of the independently originated, owned and managed Whole Earth Access Company (not even in licensing royalties for the name, since Point does not have a trademark on it). In a confused way we are blamed with each other's failures. Point gets dumped with grudges about WEAccess's unabashedly mercantile attitudes, while they get Catalog customers expecting to buy tipis and hand grain-mills in a groovy non-commercial atmosphere, but who are disappointed to find harried sales clerks selling Cuisinarts and Reebok sneakers. The mess actually helps sharpen both our identities.*

Twenty years ago at the birth of the Whole Earth Truck Store, Stewart saw a developing niche for a wide-ranging selection of highly evolved, but not expensive, products. He was a keen prophet but a lousy shopkeeper, by his own admission, and the retail business

Kevin Kelly

Thirty friends and coworkers from Apple Computer, Brøderbund, and Point cram into Whole Earth's courtyard for a self-crit of the *Electronic Whole Earth Catalog*. The conversation ranged from specific improvements of this product to speculations on where hyper-linked media are taking us.

The Electronic Whole Earth Catalog **won 2nd Prize in the 1989 SuperStacks Hypercard Application Contest sponsored by *MacWorld* magazine.**

flopped. He figured he'd do better selling information, and let others evolve the selling of merchandise. They've done great, judged by the measure of money flow. We've done fine, too, judged by the measure of information flow. So now — Further!

The Whole Earth Institute. *Susan Frank, fundraiser for Point, described the progress in launching our newest endeavor, our version of Further — the Whole Earth Institute. Point Foundation has been marvelous in cultivating the unorthodox for two decades. But in the last few years, the whole Earth has moved from being the badge of outlaws to become the emblem for a generation of civic-minded activists. And while Point has been expert in incubating low-rent unconventionality, and will continue to do so wholemindedly, it hasn't the experience or the resources to nurture the global demand of a Whole Earth perspective.*

We need a well-funded organization, with new minds, more contacts, and a passion for active research and development. We're calling this R & D arm the Whole Earth Institute. We are sticking with the name "Whole Earth" despite its not being avant-garde any longer, almost because *it is slightly generic now. Naming the Institute this way reflects that this is no longer a fringe movement, but one centered in the very heart of the social, business, and spiritual concerns of mainstream citizens. Environmental, global, and whole Earth issues may well be the major edge in the 1990s.*

To this end, we are seeking substantial funding from individuals, foundations, and corporations. We are aiming to build an endowment fund for the magazine, and a general fund for the Institute to develop various projects. At the core will be a Founders' Circle for individuals or institutions contributing more than $10,000. The Founders' Circle will meet once a year with the Point board of directors (Stewart Brand, Paul Hawken, Doug Carlston, Bob Fuller, Chuck Blitz, Huey Johnson, and myself) and Whole Earth staff for a weekend brainstorming session

READER SERVICES: **HOW TO . . .**

. . . Subscribe to *WER*

Subscriptions to ***Whole Earth Review*** are $20/one year (4 issues) and $37/two years (8 issues). Foreign rates are $24/one year and $45/two years. For air mail delivery anywhere in the world, add $8 per year. Send your order with payment to: ***Whole Earth Review***, P. O. Box 38, Sausalito, CA 94966, or call 415/332-1716.

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If your subscription has a defect, please address all correspondence to us at P. O. Box 38, Sausalito, CA 94966.

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Most back issues are available from us for $6 each, postage paid. The following issues are rare or out of print: 1, 3-9, 27, 28, 52, 55, 57. Bound, xeroxed copies of these rare issues are available for $30 postpaid; collectors are invited to inquire for prices and availability. Send prepaid orders, or requests for a complete list, to 27 Gate Five Road, Sausalito, CA 94965, or call 415/332-1716.

. . . Adopt A Library

Share the *Whole Earth Review* — give a library a subscription! These people have (since last issue):

Milo Jarvis to Haskell Indian Junior College, Lawrence, KS.

Dan DeBrito to GMI Library, Flint, MI.

Michael Madnick to Durango Public Library, Durango, CO; Wood River Public Library, Wood River, IL.

Gail and Tremaine Arkley to McMinnville Public Library, McMinnville, OR.

Oregon and Iowa Librarians: Gift subscriptions are available through the generosity of Gail and Tremaine Arkley, and that of Ed Mead.

If you would like to adopt a library, send your contribution to: WER Library Fund, 27 Gate Five Road, Sausalito, CA 94965.

If you are a librarian who would like a gift subscription for your library, send your request to Susan Rosberg at 27 Gate Five Road, Sausalito, CA 94965.

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. . . Rent Our Mailing List

Send a letter to Keith Jordan, ***Whole Earth Review***, 27 Gate Five Road, Sausalito, CA 94965 for rates and information.

Recent renters: Archie McPhee, Cultural Survival, Garbage Magazine, Smith and Hawken, Wiccan Summer Intensive.

If you want your name left off mailing list rentals, please write and tell us.

. . . Order From Whole Earth Access

The phrase "or Whole Earth Access" that appears under most of our access information means you can order the product from the Whole Earth Access Company, an outfit inspired by the ***Whole Earth Catalog*** but not financially connected with us in any way (see p. 136). *Do not send orders to **Whole Earth Review.***

Whole Earth Access: 2990 Seventh Street, Berkeley, CA 94710. 415/845-3000; 800/845-2000.

All orders are shipped UPS unless otherwise specified. $3 shipping-and-handling fee for up to five books, 50¢ for each additional book.

Large orders (over 20 books) will be billed at actual UPS rate.

UPS Blue Label is available at $6.50 for up to five books.

Foreign orders (surface mail): $4 for first two books, 50¢ for each additional book.

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For computers and software:
Whole Earth Electronics, 1311-B 67th Street, Emeryville, CA 94608; 800/323-8080.

on "great things to do next." It is the wild and wooly ideas, unexpected perspectives, and off-center expertise of these future Founders that I look forward to most. Their energy and support is more valuable than the substantial money they bring. I think it was Ram Dass who gave this advice: "Even when you are fundraising what you really want is not money, but supporters."

Susan Frank put together a remarkably succinct package outlining our colorful history, our on-going present condition (some color, with much overcrowded clutter), and our realistic future plans for the Whole Earth Institute. There are a few more details on page 140. If you'd like to be included in the Founder's Circle, or want to recommend a person or institution/corporation you know who would be interested, please contact Susan Frank at this office.

One last item on my notes from the staff meeting was a preview of what we had in the pipeline for coming issues. This year has been out of the ordinary in that we've had a series of issues with special sections determined far in advance, the current one in your hands being one of them. Usually themes in an issue converge as it is being assembled. Two known "theme" issues approach. Next issue novelist Will Baker briefs readers on his five-continent, around-the-world trip interviewing teenagers to see if there is an emerging "global teenager." Other global wanderers also contribute their observations from remote and/or influential lands such as Russia, Tibet, Bulgaria, and Vietnam. It's the most whole-Earth-review **Whole Earth Review** *yet.*

In the issue following, Richard Nilsen marshals into one place his research on restoring environmental habitats. The focus is on methods, tools, strategies, and realism. How DO you heal screwed up streams? Surprisingly, he has found that restoration is quite controversial among environmentalist groups. Certain nature organizations deliberately shun a restoration movement because they fear it will rationalize continued destruction ("We can always restore it," says the Shark). We are interested in the local science, from backyard scale on up. Send restoration success stories, useful tools, or reasons not to restore, to Richard. This special issue will be published in the spring, just in time for the twentieth anniversary of Earth Day.

After that it's up to you. We pay for anything we publish, including letters to the editor. (I wish I could personally respond to every letter, but I can't do that and get the magazine out too.) Shorter things have a better chance of getting printed than 20-page manuscripts. What little-known book are you currently riveted by? — let us know. What obscure stuff are you finding yourself xeroxing for friends? — there's a chance we may find it interesting as well. What's an untold story you know that few others have an inkling of? — that's what the next issue may be about.

To the same degree that we need your subscription payment for the magazine, we need your ideas and recommendations. Send them to 27 Gate Five Road, Sausalito, CA 94965. —*Kevin Kelly*

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The Electronic Whole Earth Catalog	____ @$150 each	= ____
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The Fringes of Reason: A Field Guide to New Age Frontiers, Unusual Beliefs & Eccentric Sciences. This **Whole Earth Catalog** of weird stuff grew out of Ted Schultz's special issue of WER (#52), our all-time bestseller. **Fringes** presents expert opinion from skeptics and true believers on spontaneous human combustion, alien abductions, flat earth, Atlantis, etc. **$13**

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The Essential Whole Earth Catalog (1986). Packs a wealth of information of the what-it-is, how-to-use-it, where-to-get-it type into a smaller, handier size. Over 400 illustrated pages of the best of the best, from crafts, climbing and communications to learning, landscaping, and beyond. **$17**

News That Stayed News. A collection of the best writing from ten years of **The CoEvolution Quarterly**, forerunner to **Whole Earth Review**. *"A three-ring circus of writing, a treat for anybody who enjoys juggling ideas or going out on the intellectual high wire without a net."* —LA Times. **$14**

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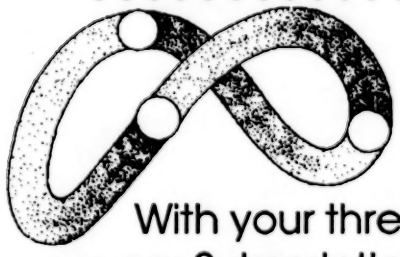

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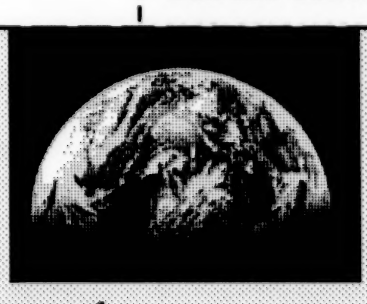

WE'D LIKE you to join a remarkable group of people launching the new Whole Earth Institute, described on page 140. If we have been of use to you, support us as we prepare for our third decade of good work.— *Kevin Kelly*

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NEXT ISSUE

BY the mid-1990s over one-half of the world's population will be kids under the age of 20. We asked some of these teenagers around the world what kind of future they are preparing for us. The results of our survey are featured next issue in "The Global Teenager."

North Indian Sikhs
in the old school tie

BACK ISSUES

No. 1

WHOLE EARTH REVIEW (*CoEvolution Quarterly* through issue #43)

Back issues can be ordered for $6 ppd., except where otherwise noted; "OOP" means out of print: bound, xeroxed copies of out of print issues are available for $30 ppd. Send all orders to:

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No. 32

1. Spring 1974 - Paul R. Ehrlich reveals the organic nature of communities; an introduction to Buddhism by Rick Fields; and notes on Southwest American Indian Medicine. $100

2. Summer 1974 - Paul Krassner's "Tongue Fu"; Paul and Anne Ehrlich on the food shortage crisis; Michael McClure's GORF; apple picking, bookmaking and Stephanie Mills running a modern salon.

3. Fall 1974 - Guest edited by the Black Panther Party. Community organizing and running for public office; a proposal to eliminate the presidency, and the songs of Elaine Brown. $10 (damaged)

4. Winter 1974 - Lewis Mumford on the energy drain and the next transformation of man; thoughts and a reading list from Gregory Bateson; a photo spread by Robert Frank; and an introduction to creative philanthropy. $25

5. Spring 1975 - R. Buckminster Fuller considers the year 2025; Nitinol springs into view; S.N. Durkee gets an inner-view of the Middle East; and Baker-Roshi gives a sesshin lecture. $25

6. Summer 1975 - The Gaia hypothesis proposed — that the earth behaves as if it were an organism; the structure of mystical experience; Bateson on reality vs. redundancy; Ramon Margalef on ecological theory. OOP.

7. Fall 1975 - The first Space Colonies issue. Gerard O'Neill kicks off the controversy. E.F. Schumacher on the difference between unity and uniformity. Orville Schell's photo essay on working in China. OOP

8. Winter 1975 - How drought was handled in Indian villages; the Ohu communal movement in New Zealand; the early stirrings of the anti-war movement in Europe; a visit to Marlon Brando and a look at gambling. OOP.

9. Spring 1976 - The 2nd Space Colonies issue; Amplifications on the first from a galaxy of *CQ* stars; four poems by Gary Snyder; "Take as Directed" (the Third Wave) by Ron Jones. OOP.

10. Summer 1976 - "The Man Who Planted Trees and Grew Happiness"; a report on the Hoedads; Ursula LeGuin on menopause and Steve Baer with a reminder that the Bomb is still there and still bad.

11. Fall 1976 - Underground architecture; life on Mars; the mind/body dualism conference; Theodora Kroeber on cross-generational marriage; Ken Kesey on education; and Michael Phillips: "The American Anti-Whaling Movement is Racist."

12. Winter 1976 - The Watersheds issue. With asides on Christo's running fence; interspecies music and Taj Majal; the New Alchemy Institute and the first part of "The Acorn People," by Ron Jones (concluded in Issue #13).

13. Spring 1977 - Running the arms race backwards; Herman Kahn and Amory Lovins debate the New Class; how Australian trade unions make green bans work; William Burroughs on his Buddhist retreat.

14. Summer 1977 - Voluntary simplicity analyzed from the viewpoint of spiritual leaders and of businessmen; how astronauts use the bathroom in space; Elizabeth Kubler-Ross, tells about the experiences that have made her believe that death does not exist; science fiction story by J.G. Ballard.

15. Fall 1977 - How the back to nature movement in Germany in the '20s may have helped pave the way to Nazism; Huey Newton reporting on living in Cuba; articles on new crops for desert areas of the world; what happens at a spiritualist resort.

16. Winter 1977 - Guest edited section on Broadcast: "Four Arguments for the Elimination of Television," an essay on how the mass media are smothering us; four lost pioneer broadcast inventors (including Nikola Tesla); Paul Krassner on the hypnotic regression of a television addict; and Marshall McLuhan talking to Gov. Jerry Brown about cultural change.

17. Spring 1978 - How the way you think may cause disease; Wendell Berry debating Earl Butz on what farming should be; Ken Kesey on cops without guns; articles on recombinant DNA as a Good Thing for the environment; how and why to tell your children stories.

18. Summer 1978 - Thomas Szasz on why no one should be sent to mental hospitals; part of Gregory Bateson's new book; a special section on space - other countries' space programs, space business, and astropollution; also life in a Mexican jail; Mimi Fariña on entertaining in institutions.

19. Fall 1978 - An entire issue guest-edited by poets Lawrence Ferlinghetti, Michael McClure, David Meltzer and Gary Snyder. Entitled "The Journal for the Protection of All Beings," it includes Allen Ginsberg's "Plutonian Ode," Anne Waldman's "Plutonium Chant," Susan Griffin on the relationship between the urge to destroy nature and the urge to destroy women; and a previously unpublished poem by Jack Kerouac.

20. Winter 1978 - "10th Anniversary Issue." Fifty-six 5-minute speeches by such *CQ* regulars as Theodora Kroeber, Sam Keen, David Brower, George Leonard, Wavy Gravy, Paolo Soleri, J. Baldwin, Ron Jones, Peter Warshall, etc.; excerpts from Anne Herbert's Rising Sun Neighborhood Newsletter.

21. Spring 1979 - How chemicals are harming our genes; Dan O'Neill defying the U.S. Supreme Court by drawing Mickey Mouse; Judy Chicago on "Revelations of the Goddess"; useful magazines reviewed by Nicholas Von Hoffman; Ursula LeGuin, William Irwin Thompson, Margo St. James, Ernest Callenbach, Robert Rodale and many others.

22. Summer 1979 - Reports on personal computer networks used cross-country for everything from gossip to business conferences to fantasy games; the late E.F. Schumacher's belief that tree crops can save British agriculture; and the man who avoided banks and financed his own home by borrowing $10 each from dozens of friends.

23. Fall 1979 - Special issue on oceans; John Todd on ocean arks; Phil Conkling models the global carbon cycle; articles on boat restoration; 30 pages of reviews and access in the Whole Sea Catalog; proposal for a 1,200-acre solar village.

24. Winter 1979 - How corporate patenting of seeds will cause hundreds of plant species to be lost forever; good solar building designs used throughout history; Gregory Bateson on ending the arms race.

25. Spring 1980 - Turning back the desert by planting trees; using light rail to revive public transportation; James Lovelock on being a self-employed scientist; Shramadana — sharing energy.

26. Summer 1980 - Native American running; amateur insemination by lesbians; Ivan Illich on vernacular values; Lynn Margulis on a new theory of how evolution happens.

27. The Next Whole Earth Catalog — 608 pages, 3,907 items. Not available.

28. Winter 1980 - Guest edited by Anne Herbert; account of the death of Gregory Bateson by his daughter Mary Catherine; the evils of circumcision; good news about the neighborhood life from the editor and others; Orville Schell on the dangers of feeding antibiotics to livestock. OOP.

29. Spring 1981 - Robert Frank's first still photographs in years on the cover; articles on computer slang; homeopathy; the life of a secretary; the solar sail as a cheap way to space travel.

30. Summer 1981 - Local politics praised in articles by Karl Hess and Michael Phillips; inflation exposed as an illusion by Paul Hawken; a manual on "How Not to Commit Suicide"; investing successfully with $50 to $5000; making love in space.

31. Fall 1981 - Paul Ehrlich warns social scientists to beware of "physics envy"; James Lovelock elaborates on the Gaia hypothesis, tactics for halting the arms race; clowning; tree huggers protecting forests.

32. Winter 1981 - Guest edited by Peter Berg and Stephanie Mills. Bioregions Special. Articles on ecopolitical decentralism in the U.S., Europe, and Africa; a report on the forced relocation of thousands of Hopi and Navajo Indians; a chapter from Murray Bookchin's Ecology of Freedom; regional bibliographies.

(More issues next issue)

"Inwardness is the characteristic feature of the vegetable. . . . If there is movement in the consciousness of plants then it must be the movement of spirit and attention. . . . [For humans] the life of the spirit is the life that gains access to the visionary realms resident in magical plant teachers."

—Terence McKenna,
in "Plan/Plant/Planet," p. 5.

Photowork by Andy Goldsworthy, a 33-year-old British artist living in Dumfriesshire, Scotland. He works with "commonplace materials — dandelions, sycamore, hawthorn — and other often neglected plants and trees that many ecologists don't like."

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